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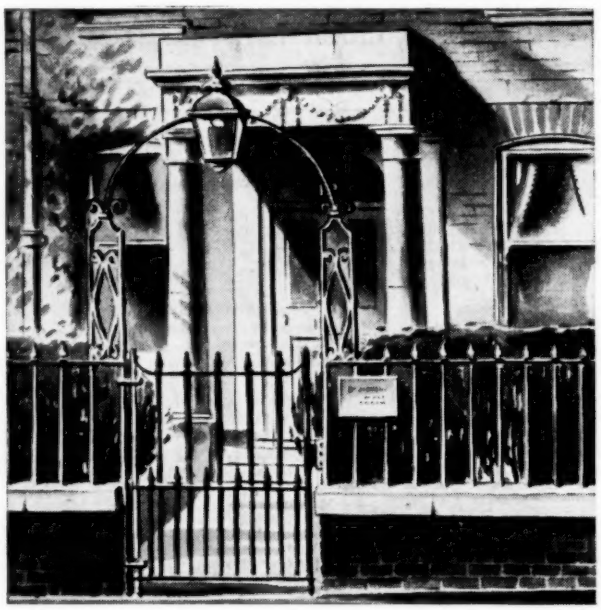

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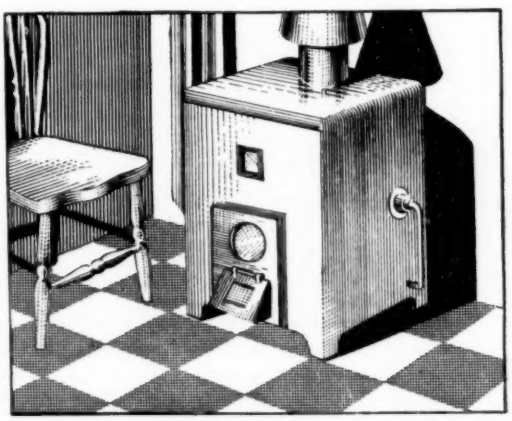

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ADDRESSES AND ORIGINAL ARTICLES

THE MICROGLIA*

BY PIO DEL RIO-HORTEGA, M.D. Madrid, D.Sc. Oxfd

NEUROPATHOLOGIST, UNIVERSITY OF OXFORD; LATE DIRECTOR OF THE LABORATORY OF NORMAL AND PATHOLOGICAL HISTOLOGY, UNIVERSITY OF MADRID

(*From the Nuffield Department of Surgery, Oxford*)

ACCORDING to classical ideas, nerve tissue is formed of two kinds of cells which differ in form and function—namely, nerve cells and neuroglia cells. It has been necessary to admit, in addition, the existence of a third group of cells which I have called microglia.

The nerve-cells are the main constituent of the nervous centres. The glia cells are of a subordinate nature: they may serve such purposes as the isolation and protection of nerve-cells or may assist in their nutrition and in the neutralisation of endogenous poisons or they may produce internal secretions; but these functions are as yet hypothetical. The microglia, or third element, although it is not a part of the fundamental architecture of the central nervous system, is always present in nerve tissue; indeed, it is intimately associated with its elements for the auxiliary, but nevertheless necessary, task of taking up, transforming and removing the products of normal metabolism and abnormal disintegration of neurons.

Each of the three elements of the nervous system reacts differently to disease. The nerve cells suffer degenerative changes, the glia cells show a tendency to proliferate in cicatricial processes, while the microglia cells work intensively to take up and elaborate in their cytoplasm the products of degeneration of the other elements.

The pathological substratum of a nervous disease will vary according to the localisation and intensity of the anatomical alterations, the way in which the nervous elements degenerate and the glial elements react, and the macrophagic activity of the microglia. That is why modern neurohistopathology is based on the search for each of the three elements that are associated in the texture of the nerve centres, and this study will be successful only if the morphology and physiology of these elements are well known.

I am going to develop in this lecture my ideas on the third element of the nervous system (microglia), which has also been known by the name of Hortega cells, and I shall describe its histogenesis and its morphology in health and disease.

ORIGIN OF MICROGLIA

I shall start by affirming that the microglia cells have a mesodermal origin. This agrees with the opinion held by former workers; for example, Boll, Eichhorst, Lachi and His all suggested that the nerve centres contain elements of a mesenchymatous origin, different from the classical neuroglia, and they reported the presence in nervous tissue, during embryonic development and also in pathological conditions, of wandering cells of multiple form. This conception of the mesodermal glia has also been maintained by later investigators. Ford Robertson called mesoglia cells the indefinite elements of the nervous system, comprising those previously known by such names as naked nuclei, or round, indifferent, cuboidal and pre-amœboid cells—all of which were later described by Ramon y Cajal as apolar cells or third element of the nerve centres. Cajal likewise suspected their mesenchymatous nature. Most of these cells, however, really belong to the oligodendroglia and are of ectodermal origin.

The appearance of phagocytic corpuscles in pathological conditions also led to the belief that the nerve centres contain mesodermal elements—these being regarded by some authors as the source of the compound granular cells and the rod-like cells of Nissl found in many brain diseases.

But as the idea of the mesenchymatous cells was based on intuitions rather than on objective findings the vast majority of neurologists were still sceptical about their existence and remained attached to the conception of purely ectodermal neuroglia. Robertson, though he described these mesoglia cells in a very objective way, was unable to interpret clearly the forms he observed, and his work was not sufficiently appreciated. Cajal also was convinced that mesodermal cells existed in the interstitial network of the nerve centres, though he had no actual proof of it. My own work started from Cajal's studies. I was able to show that, contrary to general belief, cells without processes did not in fact exist in the nerve centres and in 1919 I found that Cajal's third element, like Robertson's mesoglia cells, was formed by two kinds of cells which by their origin, shape and functions differed considerably from one another. One of them, the microglia, is the true third element since it is actually mesodermal; the other, the oligodendroglia, is simply a variety of ectodermal neuroglia.

The microglia has a mesodermal meningeal origin, has much ramified processes, has migratory activities and macrophagic functions, is more abundant in the grey than in the white matter, and is included in the general nervous and glial framework as an annexed element. The oligodendroglia, on the other hand, has an ectodermal ependymal origin; its processes accompany and surround the nerve-fibres; it has no phagocytic activities; it is very abundant in the white and scarce in the grey matter; and it is a fundamental constituent of the general neuroglial network. The two elements are thus quite different in form and function, and their responses to disease are correspondingly different and should be described separately to avoid confusion. Yet errors of interpretation are still found in the recent literature.

The microglia arises from meningeal polyblasts at a late period of embryonic development and after birth it continues to penetrate into and spread throughout the nerve tissue. During their migration through the nerve tissue the microglia cells have a round or pseudopodial shape, according to their motility; later they become ramified and when they reach their final position in the nerve tissue they have small dark nuclei surrounded by scanty cytoplasm with two, three or more slender, curving, branching and prickly processes. These processes end freely; they do not anastomose with each other or with neuroglial elements.

The microglia is the part of the reticulo-endothelial system—using the term in its fullest sense—belonging to the nerve centres. Its essential properties, so far as they are recognised, include the uptake of colloidal particles and the devouring of red blood-corpuscles and cellular debris. Its main physiological function is the elimination of the waste products of neuronal metabolism.

* A lecture delivered in the University of Oxford on Nov. 2, 1938.

The microglia takes an active part in all inflammatory and necrotic processes of the nerve tissue, and when mobilised and serving as a macrophage it assumes many different forms, the best known being the compound granular cells and the so-called rod-like cells discovered by Nissl.

It is possible that microglia cells exist in early stages of embryonic development but they become visible only in the last period, when the meningeal and vascular organisation of the brain is well advanced. They are to be seen in large numbers in the superficial white matter of the brain-stem, and in the deep regions of the cerebral hemispheres, of advanced embryos or newborn animals, where they show a very irregular distribution. The most important fact in relation to the origin of the microglia can be verified in the small laboratory mammals—i.e., mouse, rat, rabbit and cat; for in these animals it is seen to appear in superficial parts of the brain, immediately underneath the pia-mater, earlier than in the neighbourhood of the ventricles. This proves that the microglia in its origin is not related to the ependymal cells.

There are in the brain two main sources of microglia: (1) the superior tela choroidea, which lines the cerebral trigonum and the optic thalamus, and (2) the pia-mater, which lines the cerebral peduncles. In the cerebellum the main source of microglia is also located in the pia which lines white surfaces, and especially in the inferior tela choroidea. In the bulbopontine region, as also in the spinal cord, the microglia arises similarly from the pia-mater and its foldings. Besides these main sources, the microglia also arises, although to a much smaller extent, from pial elements of the cerebral and cerebellar surface and mainly from the adventitial layers of the large and medium-size blood-vessels. From all these regions the microglia cells enter the encephalon in large numbers and rapidly spread throughout the nerve tissue. This takes place in a short time, and within ten days after birth the microglia is present in all parts of the central nervous system.

Which are the elements of the pia-mater that, on entering the nerve tissue, give rise to microglia I do not know with certainty. Present histological methods do not detect the initial stages of transformation of microglioblasts. Nevertheless in the pia and adventitial connective tissue nuclei resembling lymphocytes are present in large numbers in those places where the microglia is formed, and I am inclined to believe that those nuclei are the mother elements of microglia. The lymphocyte-like bodies, corresponding to the polyblasts of connective tissue, immigrate into the nerve tissue, and this might explain why microglia cells are able to develop migratory activities and amœboid and pseudopodial movements, and may be converted into macrophages.

MORPHOLOGY OF THE CELLS

In the first stages of formation of the microglia there exist under the pia-mater laminar, cuboidal or round cells which spread irregularly or form a continuous layer which is thicker at the points where the microglia arises. In the second phase the nerve tissue contains round cells with outgrowths and pseudopodia which begin to branch.

The nerve centres of young mammals contain round tuberous bodies, with pseudopodial processes, and these are present in surprisingly large numbers in the white matter of the hemispheres and the commissural region. These elements are young microgliocytes, more or less spherical in shape, which give out blunt tuberous expansions and short processes with a tendency to divide.

The microglia cells have two sorts of movements: (1) progression, by which they migrate through the tissue, and (2) emission of pseudopodia, which leads to their assuming ramified forms. The forms with short outgrowths last only as long as the microglia cells wander through loose tissue. As soon as the tissue becomes more compact they give out a number of processes—long or short, thick or thin—which show at first bifurcations and later ramifications. When they finally reach the places where they are to remain, a part of their outgrowth retracts; but another part persists, becoming thread-like and giving rise to secondary and tertiary branches with retractile thorns. All this tends to increase their surface. In the first period the shape of the microglia cells depends on the amœboid and progressive movements; in the second period it also depends on the structure of the tissue through which the cytoplasmic expansions spread. In moving through narrow spaces along the processes of neurons or around their bodies, the microglia cells often assume a stretched, bipolar or laminar appearance.

In adult animals the microglia consists of elements with dark nuclei which may be round, oval, triangular or elongated, surrounded by a small amount of spongy cytoplasm. This cytoplasm gives out two or more processes which become thinner as they divide more and more, in secondary and tertiary ramifications, all of which have a large number of smaller branches, which give them a prickly appearance. The processes end freely as bunches of short filaments. Although these morphological characters are to be found in all vertebrates and are constant, in their essentials, there are many variations of the general type, among which are the monopolar, bipolar, multipolar and laminar cells.

All parts of the central nervous system have microglia; but it is distributed in accordance with the general architecture and is more abundant in the grey than in the white parts. The microglia cells are not equidistant, but each has its own zone of influence. Their processes rarely cross and never form plexuses.

These are, in brief, my observations on the normal characters of microglia. They have been amply confirmed, although some authors have been slow to accept my ideas. It is always difficult to replace deeply rooted ideas, and some fundamental conceptions, such as the mesodermic origin of microglia, are still under discussion. Embryological observations, however, demonstrate its mesenchymatous nature and they are supported by the physiological observation that it behaves as a mesodermal element. Certainly no-one has shown that non-mesodermal elements in the body can act as microglia does.

FUNCTION OF THE MICROGLIA

The main differences of behaviour between the microglia and the macroglia are intimately related to their origin. The macroglia—i.e., the astrocytes and oligodendrocytes—is ectodermal and never has macrophagic functions. The microglia, on the other hand, is mesodermal and its main function is phagocytosis. Nevertheless, the morphological analogy between fat-granule cells and oligodendroglia continues to be a source of misunderstanding.

In this period of nervous histopathology—which might be called micro- and oligo-dendroglial—in which all neurologists study the behaviour of the two cellular types in disease, it is important to know

well their reactive potentialities. The activities of microglia have been thoroughly explored in normal and in pathological conditions and though they are not yet completely known it may be affirmed that all phagocytosis† in nerve centres is exclusively carried out by microglia cells. It comes into play in all focal or diffuse disintegration of the nervous tissue, in all degeneration of nerve and glial cells, in acute and chronic inflammatory processes, and also in necrotic and hæmorrhagic conditions. The microglia, therefore, preferentially takes up residues of neurons and their abnormal metabolites, red blood-corpuscles and dead cells. Its phagocytic activities can be summarised in the words neurophagia, hæmophagia and cytophagia.

As long ago as 1919 I was able to observe in microglia the characteristic properties of Aschoff's reticulo-endothelial system, especially hæmophagocytosis. Since then many workers have tried to show that the microglia in the nerve centres is the equivalent of the reticulo-endothelial system, and that it has the general and specific functions attributed to that system by Aschoff, Kiyono and others. F. J. Asua, in my laboratory, later developed this idea.

It is known that the reticulo-endothelial system is made up of elements which all have similar functions, such as storage of colloidal particles, destruction of erythrocytes, and phagocytosis and chemiopexis. The products taken up are digested and transformed; hæmoglobin is broken down to form biliary pigments and hæmosiderin. The microglia has most of these functions, but as it has not been shown to take up colloidal particles doubt has been cast on its being really a part of the reticulo-endothelial system. Phagocytosis and hæmophagy are the only functions of microglia that can readily be demonstrated, and attempts to prove that it can take up and store acid dyes and colloidal particles, without previously producing brain injuries, have so far met with little success.

This resistance to the storage of certain substances may be put down either to specialisation of the microglia or to the existence of a hæmo-encephalic barrier that prevents the passage of colloidal matter. In the first case the microglia would be specially adapted to the inclusion and transformation of katabolic products and of nerve waste, phagocytosis of red blood-cells being a fundamental property that it shares with the reticulo-endothelial system. If on the other hand there is a hæmo-encephalic barrier, the microglia may be able to take up carmine, indian ink, pyrrol-blue, trypan-blue, &c., if the impermeability of the vascular endothelium has previously been destroyed. Observations made after experimental brain injuries have shown that microglia cells can in fact take up dyes which reach their neighbourhood.

The experiments of vital staining demonstrate that dyes can reach the microglia cells provided the hæmo-encephalic barrier is removed in some way. When this barrier does not exist, as in pure cultures of microglia, carmine is rapidly taken up by the cells, as I. Costero was able to show in my laboratory.

All these facts demonstrate that microglia is part of the reticulo-endothelial system. Among its functions phagocytosis is the one that is preferentially carried out.

THE MICROGLIA IN DISEASE

I shall now turn to the functions of the microglia under pathological conditions.

† The term phagocytosis here refers to macrophagic activity and is not meant to include the microphagocytic function of the polymorphonuclear leucocytes.

I have already pointed out that during the immigration of the microglia cells into nerve tissue they undergo a complete morphological evolution, the primitive rounded forms being transformed into stellated ones with many ramifications. In disease, as these cells get into motion and take an active part, they show a new change in a reverse direction: by increasing retraction of their processes, they pass from the ramified forms of the resting state into the rounded one which is characteristic of a state of movement and cytoplasmic repletion.

The evolutive cycle of microglia cells has three morphological phases, and these are related to the two essential properties of their cytoplasm—namely, plasticity and amœboidism. The first phase is embryonic, amœboid and kinetic; in the second the cells are stabilised and settle down in the nervous network; in the third they regain mobility and amœboidism and become macrophagic. These three phases correspond to the stages of wandering cells (embryonic cells, movable but resting), adult cells, and mobilised or active cells.

Microglia cells in the resting state do not seem able to make movements of progression, but their cytoplasm may have a certain plasticity and show amœboid movement with emission and retraction of cell pseudopodia. Its potential properties—tropism, taction, and gliding movement—are held in reserve. When destruction of nerve tissue induces activity in the microglia, the nearer cells are the first to come into action, but they are soon followed by others situated further away which pass through the tissue by means of amœboid or gliding movements.

The capacity of microglia for migration has sometimes been denied but the evidence is conclusive. In 1919 I showed by a simple experiment that it is capable of rapid movements and of starting phagocytosis very early: a small region of the brain was destroyed with a hot needle; twelve hours later microglia was mobilised around the wound and after twenty-four hours the damaged area was completely invaded by microglia cells with great macrophagic activity. Many other workers have also observed that in the places destroyed by experimental burning microglia appears. These cells must come from neighbouring regions. Costero has demonstrated in cultures that microglia cells not only send out pseudopodia but make movements of progression.

As the microglia cells are mobilised and take on phagocytic functions, their shape changes; they retract their long processes, give out new pseudopodia and ingest red blood-cells and cellular fragments. The first morphological change is an increase of volume, which occurs earlier in the dendrites than in the body of the cell; the processes become thicker and their outline appears angular and thorny. In the second phase the processes retract and thicken still further, and the cellular body increases in volume, assuming a reticular structure.

In moderately severe inflammatory processes the microglial changes stop at this point, but one often finds long rod-like forms and also laminar ones surrounding the nerve cells and blood-vessels. With the retraction of the processes and the polarisation of the cytoplasm the nuclei become elongated and the cells assume a stretched-out bipolar form, sometimes of remarkable length. These types never fail to appear in slow inflammatory processes—e.g., general paralysis—themselves following the same direction as the pyramidal cells, with the apical processes of which they get closely in touch. The most typical rod-like cells have very large, straight or curved nuclei; the scanty cytoplasm

surrounding them is extended along the main axis in two long thin bands, often with a number of collateral branches. By means of specific stains it is often possible to show the presence of fat droplets and iron deposits. H. Spatz and A. Metz have observed that the microglia cells are the only ones that give a positive reaction for iron in general paralysis; but these cells do not normally give the iron reaction.

Around the nerve cells and blood-vessels in most inflammatory conditions may be seen flattened microglia cells corresponding to the first stages of microglial alteration. If the macrophagic activities of the microglia are only slow and of moderate intensity the morphological changes do not go further than hypertrophy or the assumption of laminar or rod-like shapes; but if on the other hand they become intensive, in places where degeneration or destruction has taken place, the cells load themselves with ingested waste materials and assume globular or rounded forms which are very similar to the embryonic types. In the first period the body cytoplasm increases in size while the processes decrease; in the second period the processes become fewer and less ramified; in the third period the processes retract still more and grow thicker, and the body cytoplasm swells and takes a vacuolated appearance. In the fourth period the processes have retracted almost completely and the cell has a spheroidal or lobular aspect with tuberosities and short pseudopodia. Finally, the last trace of processes disappears and there remain spherical bodies with a reticular vacuolated cytoplasm. These are the scavenger or compound granular cells—the *Gitterzellen* of the German authors.

During these metamorphoses the microglia cells, acting as scavengers, become loaded with phagocyted products which very soon are transformed by their cytoplasm. Within 24 hours of experimental injury compound granular cells appear in the brain, and they are also to be found very soon in cases of brain softening. In hæmorrhagic processes the microglia shows an extraordinary greediness for red blood-corpuscles, which it rapidly takes up and transforms. Five or six days after a hæmorrhage microglia cells loaded with fat and iron can be seen around and inside the hæmorrhagic foci.

The fat-granule cells, whose origin has been so much discussed, arise essentially from the microglia, although they can also be formed by the perivascular histiocytes as well as the other elements of the reticulo-endothelial systems. In fact some of these elements are in form and function so similar to microglia that confusion can arise.

Neither the astrocytes nor the oligodendrocytes ever give rise to fat-granule cells. They may contain fat droplets as products of their own degeneration; granules of exogenous origin may be adsorbed on their surface; and they may contain hæmosiderin. But the hæmosiderin has entered the cell in solution; astrocytes and oligodendrocytes never contain granules of iron or globules of fat ingested in phagocytosis, and though they can be passively loaded with material, they are unable to take it up actively. Active phagocytosis in the nerve centres is exclusively carried out by the microglia cells.

What happens later to the substances which the microglia has taken up and transformed is uncertain, but it is reasonable to suppose that they are utilised by the microglia itself, since its volume increases and it rapidly begins to proliferate. On the other hand there are also grounds for believing that the microglia cells, through their capacity for displacement, can convey material to the blood-vessels.

SUMMARY

Nerve tissue contains a type of cell with properties corresponding to those of the reticulo-endothelial system. The chief function of these cells (the microglia) is the phagocytosis of waste products, and, if need be, of red blood-cells.

The microglia arises from meningeal polyblasts which immigrate into the nerve tissue and assume a stellar and ramified shape. Even when they are in apparent rest, microglia cells remain capable of migration, and under pathological conditions they are mobilised to undertake phagocytic activity.

Phagocytosis in nerve centres is a specific function of microglia; despite opinions to the contrary, neither the astrocytes nor the oligodendrocytes take part in it.

Microglia cells take up the products of disintegration of the nerve tissue, digesting and elaborating them, and making them finally disappear, probably by transporting them to the blood-vessels.

These ideas have been developed in my papers from 1919 to 1921, and though they have been discussed in many subsequent papers by other workers, almost nothing new has been added to our knowledge of this subject. Today these ideas are widely accepted.

INFANTILE DIARRHŒA *

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(*Concluded from p. 973*)

Treatment

THE treatment of infantile gastro-enteritis is fraught with difficulty, with anxiety, and frequently with disappointment. The more deeply the matter is studied the more evident it becomes that an intimate knowledge of the normal metabolism of the infant is of paramount importance.

WATER METABOLISM

The outstanding feature of these babies is the dehydration, and this is responsible for most of the other clinical signs. This demands immediate attention, and for a proper understanding of the responsible factors, and therefore the appropriate treatment, the physiology of water metabolism must be studied in detail.

Approximately two-thirds of the weight of the human body is water. Actually for the adult the figure is about 60 per cent., but the water content of the infant is rather more and has been estimated to be about 70 per cent. (McQuarrie 1933). Of this body water some two-thirds is present within the cells—i.e., intracellular or "living water"—and the remaining third is found in the circulating fluids (McCance 1938). The blood volume according to body-weight is relatively much higher in infants than in adults. Infants seem to have blood volumes too large for their weight but too small for their body surface (Rowntree and Brown 1929).

Within recent years much research work has been devoted to the measurement of the water balance of the body and the various controlling factors, with the result that information of practical value has been forthcoming. In health there is a delicate

* Ingleby lectures delivered at the University of Birmingham on March 28 and April 4.

adjustment between water intake and output, so that the body content remains remarkably constant. The intake of water comprises the water drunk, the water content of the food, and the water resulting from the oxidation of food within the body. The output of water takes place through the kidneys, the lungs, the skin, and the bowels, whereby the temperature of the body is controlled and various waste products are eliminated. With regard to water loss by the various routes, that lost by the skin and lungs is least subject to variation; in fact the output by these routes remains practically constant irrespective of the fluid intake. The water lost in the urine is subject to very wide fluctuations, and, other things being equal, the urine output reflects accurately the water intake. In cases of severe deprivation of water the urine excretion may practically cease entirely for a time, but loss to some extent continues through the skin and the lungs. On the other hand, excessive fluid intake produces great augmentation of urine output without appreciable increase by vaporisation. Levine et al. (1938) proved these facts in a comprehensive study of the water exchange of infants. Their figures for healthy infants showed that of the daily water loss from the body 45 per cent. was excreted through the skin and lungs and 43 per cent. by the urine, but their figures were subject to wide variation. Signs of serious dehydration appear when the human body has lost 10 per cent. of its water content (Rubner, quoted by Rowntree 1922), which is approximately 6 per cent. of the total body-weight (Coller 1936). The loss of 20 per cent. of the body water will result in death (Maddock and Coller 1937).

It is generally accepted that a healthy infant requires about 2½ oz. of water per lb. of body-weight per day to maintain water balance, and recent carefully controlled investigations have proved the accuracy of this figure. Thus the body of a healthy baby weighing 12 lb. contains some 6½ pints of water, and for the maintenance of normal water metabolism the daily intake will have to be 30 oz. (approximately 1·5 c.cm. of water per calorie). If this infant becomes evidently dehydrated, as manifested by a dry tongue, a depressed anterior fontanelle, a dry wrinkled skin, and sunken eyes, it will have lost only about ¾ lb. in weight, the equivalent of 12 oz. of water. These physical signs are due to a loss of intracellular and extracellular fluids, the volume of the blood plasma tending to be maintained at the expense of the interstitial fluid. In consequence, to successfully combat these physical signs of dehydration, the volumes of both interstitial and intracellular fluids must be restored to normal (Butler et al. 1933). To restore such an infant to a normal water metabolism in twenty-four hours, it will be necessary to provide it with a total of 42 oz. of water: 12 oz. to combat the dehydration and 30 oz. for the normal requirements—i.e., about 3½ oz. per lb. of body-weight. Moreover, this quantity makes no allowance for the excessive loss that may continue. In other words, so long as a baby suffering from gastro-enteritis shows clinical signs of dehydration, its daily water requirements may be estimated to be about 3½–4 oz. per lb. of body-weight.

SALT METABOLISM

Water and salt metabolism are intimately associated, and an understanding of the one necessitates also an understanding of the other, particularly the part played by sodium chloride. Infants suffering from gastro-enteritis lose considerable amounts of salt as well as water, and the replacement of these substances on both a quantitative and a qualitative basis forms a very important part of the treatment. Sodium constitutes over 90 per cent. of the total base of the extracellular body fluids (McCance 1936), and the average diet of an adult contains 6–12 g. of sodium chloride per day. This amount, however, is more than adequate for the physiological needs of the body (Falconer and Lyall 1937), and the excess is excreted in the urine. The human body cannot store sodium chloride. If, therefore, the amount excreted rises for any reason, a corresponding increase in intake must take place if a deficiency of salt is to be avoided. Cow's milk contains about 146 mg. of sodium chloride per 10 c.cm. A healthy baby weighing 12 lb. will be taking about 20 oz. of milk per day —i.e., a sodium-chloride intake of 0·829 g.—and it may be accepted that this amount is adequate for the maintenance of normal health. A pint of normal saline contains six times this amount of salt. Alternatively, about 3½ oz. of normal saline contains the same amount of sodium chloride as is present in one pint of cow's milk.

The blood changes in infantile diarrhœa have been studied by many workers, but widely varying values for the blood-chlorides have been recorded. Hoag and Marples (1931) analysed the findings in 79 infants before the institution of treatment; 35 of these had a chloride content of the serum or plasma above the average normal value, whereas 44 had values at or below the average. Some of the children examined by Maizels and McArthur (1929) had high values for plasma chlorides, but in others the chlorides were within normal limits or reduced below normal. In a further series, however, that they examined the blood-chlorides were raised (Maizels and McArthur 1930). Cooper (1937) found that in acute gastro-enteritis the serum chloride tended to be high, whereas in chronic diarrhœa low values were obtained. He suggested that in acute gastro-enteritis there was a loss of water from the circulating blood, and that the water left the blood-stream without its full quota of chlorine. The blood of 21 infants suffering from acute gastro-enteritis, and before any treatment was instituted, has recently been examined at the Birmingham Children's Hospital (Aldridge 1939), and the average value for plasma chlorides was considerably above that obtained in a series of normals. Furthermore, even higher values were obtained in some after the administration of saline. Hartmann (1928) suggested that the administration of sodium chloride was deleterious in that it led to a further accumulation of chloride, and our work tends to confirm this view. On the other hand, Hoag and Marples (1931) contended that the administration of an amount of fluid sufficient to overcome the oliguria and maintain an adequate output of urine did not lead to an abnormal accumulation of chloride. Their view implies that the renal function for the excretion of chloride is unimpaired in infantile diarrhœa, but this is not necessarily true. On the contrary, there is evidence available pointing to definite renal deficiency. Some cases of infantile diarrhœa were described by Maizels and McArthur (1930) in which the blood was more alkaline than normal and the osmotic pressure of the plasma increased, yet the reaction of the urine remained acid. They thought that this occurrence was due to deficient excretion of base consequent upon renal damage. In this connexion, too, it is noteworthy that in diabetic coma the renal function may be so disturbed that chlorides are not excreted even when the plasma chlorides are considerably higher than normal (Fullerton et al. 1932). Investigations of this

problem are now being pursued in the research laboratories of the Birmingham Children's Hospital.

ADMINISTRATION OF FLUIDS

With all these facts in mind it will readily be appreciated that the correct treatment of the dehydration and its concomitant disturbances is far from simple. The mode of administration, quantity, and quality of the fluids are of the utmost importance. Theoretically, scientific treatment is only possible with the aid of frequent routine blood analyses, but in practice this is most undesirable, indeed impracticable, in these little patients. When vomiting is not a feature, much fluid can be given by mouth. By tradition normal saline has been considered most suitable, but in the light of recent knowledge and in practice it has several disadvantages. On account of its distinctly salty and rather unpleasant taste, infants are not willing to drink an isotonic salt solution for any length of time. Furthermore, if it should be taken in liberal amounts, there is a danger of overloading the blood with sodium chloride and thus taxing a kidney already damaged by toxæmia to excrete the excess. To overcome these objections a salt solution of half the strength of normal saline, flavoured with orange juice, has been introduced and in practice has been found to be very satisfactory. It has a pleasant taste and is taken freely and for long periods without objection. A thirsty dehydrated infant may readily drink 1½–2 pints of this fluid in twenty-four hours. This quantity will in most instances contain an adequate amount of sodium chloride. Some prefer a glucose solution, with or without sodium chloride, but here caution is needed. Glucose is readily absorbed from the upper part of the alimentary tract. If, however, there is failure of absorption owing to increased peristalsis or other causes, the unabsorbed glucose will undergo fermentation and the diarrhœa will be aggravated. In consequence, it is inadvisable to use as a routine a glucose solution stronger than 5 per cent. There is experimental evidence to show that mixed sugars are more readily absorbed than a single sugar (Ross 1938), and clinical practice tends to confirm this. The sugar mixture of Horlick's malted milk and Mead's Dextrimaltose have a useful place in treatment in this connexion.

If, on account of vomiting, fluid given by mouth is not retained, or if for other reasons an adequate amount is not taken, then its administration by other routes becomes a necessity. The parenteral routes available are subcutaneous and intravenous injection. Intraperitoneal injections are favoured by some, but in my experience these injections have nothing to commend them. Untoward reactions have been encountered in many instances, and alarming reactions in several; so I have ceased to use this route. For *subcutaneous injections* the fluid of choice is normal saline; in fact no other is used. The injection may be a single one, the amount averaging 50–100 c.cm., or a continuous drip. Since the introduction of small-bore needles the latter method is painless and more satisfactory in that a much larger amount can be given without discomfort and with less danger. The rate of injection recommended is 10–30 c.cm. per hour up to twenty-four hours, but obviously this must vary, depending on the rate of absorption; if the rate is too rapid, local œdema will develop.

Intravenous injections may consist of normal saline, glucose, or blood, and the injection may be a single one or a slow continuous drip. In the former case the amount of fluid injected will be governed by the weight of the baby, but in no instance should the time taken for the injection be less than half an hour. As a routine the amount injected should be about 10 c.cm. per lb. of body-weight, but in the presence of any bronchitis or other respiratory complication not more than half this quantity should be given. If the continuous-drip method is employed, the average rate of flow recommended is 20–30 c.cm. per hour, and the total amount in twenty-four hours should not exceed 600 c.cm. (one pint). The indications for continuous intravenous therapy given by Wilmer (1938) were severe dehydration, cyanosis, and clinical evidence of acidosis. She recommended that the quantity of fluid should be 2 oz. per lb. of body-weight in twenty-four hours, and the fluid she used was normal or half-normal saline containing 5 per cent. glucose. The amount of fluid given intravenously was decreased as that given orally was increased, so that the total fluid taken by the two routes remained constant at 2 oz. per lb. of body-weight. In my experience this amount of total fluid is inadequate to restore normal hydration, and it is probable that some of these infants received an excessive amount of sodium chloride. It is to be noted that 30 per cent. of her patients died from bronchopneumonia, which is a not infrequent complication of intravenous therapy. The dangers of intravenous injections are too great a quantity and too rapid administration. If the quantity injected is too great, fluid passes out of the circulation and produces œdema (Cohen et al. 1933, Coller et al. 1936, and Orr 1936), in particular pulmonary œdema, when a pneumonia commonly supervenes. If the rate of administration is too rapid, the burden thrown on the heart as the result of the sudden increase in the volume of the circulation will cause collapse and death from cardiac failure.

Passing to the fluids used, although in the past normal saline has occupied a foremost place, in the light of recent knowledge, particularly regarding the high blood-chlorides in the acute cases, caution must be exercised. Knowing something of the sodium chloride requirements in infancy, it will be appreciated that in the past excessive amounts must have been administered, and it is more than likely that in some cases this has contributed to a fatal issue. The practice of using normal saline solutions as a routine for all parenteral administrations of fluid without regard to whether sodium chloride is needed or not cannot be too strongly deprecated. An isotonic glucose solution (5 per cent.) has much to commend it. The glucose can be easily and rapidly metabolised, and the water so essential to restore normal water balance is available. The food value, too, is appreciable, in that a pint of a 5 per cent. solution of glucose supplies 110 calories in a readily assimilable form. When it is not possible to obtain blood analyses, a 5 per cent. solution of glucose is a much safer fluid to use than normal saline. With the restoration of normal water metabolism any excess fluid will be excreted in the urine, and the dangers of pulmonary œdema are very much less than with a saline solution.

BLOOD-TRANSFUSION

Blood-transfusion has been very extensively used in the treatment of infantile gastro-enteritis, and in the right case has everything to commend it. Here we are supplying a fluid that will remain in the circulation and a fluid rich in antibodies and in antitoxins which must be of inestimable benefit to the toxic and dehydrated infant. Clinical experience, however, has taught that transfusions of whole blood have not invariably produced the anticipated

improvement. On the contrary, the frequency with which the reverse effect was encountered led to a detailed and systematic study of the problem. A hæmoconcentration, with a rise in the red-cell count and the hæmatocrit reading, is an almost constant accompaniment of the dehydration of infantile diarrhœa, particularly in the acute cases. These infants are not suffering from a deficiency of either hæmoglobin or erythrocytes, and therefore blood-transfusion is definitely contra-indicated. In the light of this investigation the current practice is to limit the use of whole-blood transfusions solely to those infants suffering from a true anæmia as shown by a detailed blood examination. In other cases the red cells transfused must embarrass still further the circulation; they have to be destroyed and their products excreted, thus adding a further burden to the body and perchance prejudicing a successful issue. Another point of importance in connexion with blood-transfusion is that blood-grouping alone is not sufficient to prevent reactions which, though rarely severe, are certainly undesirable. Since the introduction of the routine of direct testing in every case of the blood of the donor against that of the recipient, reactions of any kind to transfusion have been entirely eliminated.

In general, blood-transfusions are indicated in those children in whom dehydration is associated with toxæmia, and in some of these trial has been made with blood-plasma transfusions (Aldridge 1938). Invariably the concentration of the blood was reduced and immediate clinical improvement was usually obtained. There are certain technical difficulties to be overcome before this line of treatment can be widely employed, but the results so far obtained point to its being a valuable line of treatment in certain selected cases. Further results will be awaited with interest.

In all cases the total amount of fluid that the baby receives in twenty-four hours, by all routes, is of fundamental importance. It has been found in practice that the day-to-day charting of the fluid intake in ounces per lb. of body-weight has simplified this investigation and been of valuable assistance.

The other problem that constantly arises is how much sodium chloride should be given. It is not yet possible to put this procedure on a quantitative basis, and the decision has to be left to clinical instinct and such rough measures as have already been mentioned. It has been suggested that an approximate guide can be obtained by continuing the administration of saline until such time as the urine chlorides have returned to normal. This method is, however, open to certain fallacies, as has already been mentioned (Fullerton et al. 1932 and Maizels and McArthur 1929). The administration of excessive amounts of sodium chloride will almost certainly cause œdema. According to Shelburne and Egloff, the sodium ion is the œdema-producing element rather than the chloride ion (Orr 1936). In favourable cases the œdema will disappear if the total fluid intake is reduced and the sodium chloride entirely eliminated. In some cases where pulmonary œdema has developed it may be advantageous to give a small intravenous injection of a hypertonic glucose solution (10–20 per cent.) to withdraw the excessive fluid back again into the circulation. If the patient's weight, the percentage of salt in the normal body, and the plasma chlorides were known, Coller et al. (1938) claimed that the individual patient's initial requirements could be accurately assessed. Unfortunately this procedure is not yet applicable to infants.

SUPRARENAL CORTEX

It will be observed that the blood changes in infantile gastro-enteritis in many respects simulate those encountered after removal of the suprarenal cortex in animals. In such animals a concentration of the blood is one of the most constant features, and experimental evidence points to this being due to a withdrawal of fluid from the blood plasma and from the interstitial spaces. The injection of an effective amount of cortical hormone brings about a dilution of the blood and an appreciable diuresis (Harrop 1936). Besides this hæmoconcentration, a drop in blood-pressure and a rise in blood-urea and non-protein nitrogen, with nausea, asthenia, wasting, and increased susceptibility to infections, are common to both. Thus, on experimental grounds there appears justification for the administration of suprarenal cortical hormone to infants with gastro-enteritis. This method of treatment is now being explored, but the available evidence is insufficient for a considered opinion. It appears that in some cases benefit has accrued from its administration, but nothing in the way of dramatic results has been seen. Much more work remains to be done before its place in the therapy of infantile gastro-enteritis can be adequately assessed.

FEEDING

A period of preliminary starvation, during which the infant is receiving only water, glucose, and salt, may be prescribed for the first twelve to twenty-four hours. Thereafter feeding of some kind must be instituted. The various foods available are innumerable, and there is no consensus of opinion as to the best. It is, however, generally agreed that fats are tolerated badly and should be avoided or at least severely restricted. Cow's-milk mixtures are seldom tolerated well, and I have a preference for dried milks. Several dried milks are available with a low fat and full carbohydrate content, and the particular one used may be left to individual preference. Some authorities deem it important that the milk should be acidified to supplement a possible gastric deficiency and to diminish bacterial growth, but on clinical grounds this does not seem to be necessary in every case. Protein milk of one variety or another is strongly advised by some, but success is not always forthcoming. The important point is that, when feeding is begun, the feeds should be small in quantity and dilute in quality and advances in both directions made with caution. On account of their low fat content and therefore poor calorie value these foods should not be continued for very long, provided that the gastro-intestinal symptoms have abated. The change to a more balanced feed may be made as soon as the clinical condition will allow.

Apple diet.—Treatment of all varieties of infantile diarrhœa with what is now called the apple diet has been widely recommended both in Europe and in America. The routine advised is to give 1–2 oz. of ripe raw grated apple every two hours, day and night, for one to two days, and it is claimed that a rapid abatement of the diarrhœa and toxæmia is thereby obtained. There is considerable doubt as to what portion of the apple produces the beneficial effect, but most writers consider that it is due to the pectin. I have given this form of therapy a reasonable trial on several occasions and have to admit that in my experience the results have been most disappointing; indeed not even temporary improvement has been obtained.

DRUGS

Drugs are useful only for the treatment of symptoms in infantile diarrhœa. A timely dose of castor oil in

the earliest stages of the disease may be beneficial, but afterwards aperients are not only useless but may be harmful. Astringents in general are contra-indicated, for they favour retention and therefore the absorption of toxic products from the alimentary tract. Opium, however, has an important but strictly limited place in treatment; it must be used with the greatest caution and should be combined with belladonna. The restless crying infant with numerous watery stools and severe toxæmia may gain great benefit from the administration of small doses of opium and belladonna. The restlessness is relieved, the colic abates, the excessive intestinal secretions are reduced, the desire for food returns, and sleep follows. Alcohol is another useful drug of whose value I am convinced; it is a sedative, it is a food, and it is absorbed from the stomach, all of these actions being beneficial. The newer chemo-therapeutic drugs—sulphonamide and its compounds—are on trial, but I am not yet in a position to offer opinion as to their efficacy.

NURSING

I cannot conclude my remarks on treatment without paying tribute to the nursing staff of the Birmingham Children's Hospital for their unremitting care and management of these babies. It is not often that one has an opportunity of expressing in public the very real appreciation of the nursing profession that the medical profession has, and I do not intend to let this opportunity pass. Those who have been called on to treat babies suffering from gastro-enteritis know full well how much success or failure depends on the nursing. Nothing can be more disheartening than to find that, after days and weeks of fighting for the life of a baby, one's efforts have been of no avail. These disappointments, however, have never daunted the perseverance, the patience, or the enthusiasm of the nursing staff for the welfare of these infants. I am well aware of the high mortality, but I am equally conscious of the fact that, but for the sterling nursing services placed at my disposal, this mortality would have been very much higher.

Prophylaxis

Realisation of the prolonged invalidity and grievous mortality of infantile diarrhœa compels a study of its prophylaxis. First and foremost comes breast-feeding. This is nothing new, its importance has been emphasised by discerning pædiatricians for generations, but it has to be admitted that in spite of all this the incidence of breast-feeding is declining. Spence (1938) has estimated that at the present time 20–30 per cent. of babies are artificially fed from birth in many if not most of our big towns, and that not more than a third of the mothers of these towns are fully feeding their babies until the sixth month. Until this state of affairs can be rectified, infantile diarrhœa will continue to be a major problem among the diseases of early life.

Another very important precautionary measure is prompt treatment at the very first sign of any gastro-intestinal upset, as manifested by an undigested, loose, or watery stool. The immediate cessation of all feeds and the giving of liberal amounts of plain water or half-strength saline would, I am convinced, abort many cases of infantile diarrhœa. Rest to the alimentary tract at this stage is of inestimable value and in most cases is all that is necessary.

Lastly, the part played by parenteral infection in the causation of infantile diarrhœa must also be emphasised. In almost every case this infection is contracted from an adult. Those responsible for the care and management of infants must be made fully aware of this great danger and of the steps that can be taken to prevent it, both in the home and in the hospitals. In this connexion I wish to draw attention to the new babies' block of the Birmingham Children's Hospital now nearing completion. Therein each infant will be isolated in a small cubicle, and the nursing and other arrangements have been designed to prevent all extraneous infection or cross-infection among the babies in the hospital.

Summary and Conclusions

The syndrome known under the names of infantile gastro-enteritis, acute diarrhœa and vomiting, and acute intoxication is a frequent and serious disorder of infancy and early childhood. An analysis of 500 cases treated in the Children's Hospital, Birmingham, during the last few years reveals that it is essentially a disease of the early months of life, and that its incidence falls most heavily on artificially fed babies. Nowadays infantile diarrhœa has no particular seasonal incidence but is present both in the summer and in the winter months. Innumerable classifications have been advanced, but none is entirely satisfactory. At the present time much attention is being focused on the importance of infection in parts of the body other than the alimentary tract. Of the cases here considered 46·2 per cent. had evident parenteral infection at the time of admission, and the mortality-rate was 56·3 per cent. No parenteral infection was present at any time in 30·3 per cent., and the mortality-rate of this group was 11·3 per cent. A further group of 23·6 per cent. developed parenteral infection after admission to hospital, and the mortality-rate was 78·8 per cent. The relationship between infantile diarrhœa and parenteral infection has not yet been elucidated; it is suggested that sometimes this infection is the cause, but sometimes it is the consequence.

In the treatment of infantile diarrhœa the correction of the dehydration is the most important measure, and for this purpose fluid may be given by mouth, by subcutaneous injection, and by intravenous injection. Blood examination of these babies commonly reveals a hæmoconcentration, and therefore blood-transfusions are contra-indicated unless a true anæmia is proved. It is difficult to assess the amount of sodium chloride required, but it is probable that in the past excessive amounts have been administered. After an initial starvation of twelve to twenty-four hours, feeding should be begun, at first with feeds low in fat but with a full protein and liberal and mixed carbohydrate content.

Finally, for the prevention of infantile diarrhœa, breast-feeding, protection against parenteral infection, and early and prompt treatment are precautions of immense value.

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HÆMORRHAGE IN JAUNDICE

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The danger of hæmorrhage in jaundice has long been recognised. It is greatest in the few days after operation, though it may occur in unoperated cases. During the operation no abnormal bleeding is noticed and hæmostasis is generally secured without difficulty; the bleeding takes place a few days later, and the period of greatest danger lies between the third and the sixth days. The hæmorrhage usually takes the form of a slow ooze into the depths of the wound, forming a hæmatoma, or perhaps leaking on to the dressing. Less often there is bleeding from the gums, nose, or intestinal mucosa.

The frequency of postoperative hæmorrhage in jaundice has been variously estimated. Walters (1921) has stated that fully half the deaths after operation in jaundiced subjects are due to hæmorrhage, but most surgeons would probably give a much lower estimate. Table I, compiled from four papers by

TABLE I—POSTOPERATIVE DEATHS IN JAUNDICE

Author	Operations on jaundiced subjects	Total deaths	Deaths from hæmorrhage
Petrén (1918)	1891	231	30
Tennesen (1934)	549	80	4
Judd and Marshall (1931)	1181	108	19
Ravdin et al. (1938)	155	23	8
Total	3776	442	61

American and Continental writers, shows that in nearly 4000 operations on jaundiced subjects 61 of the 442 postoperative deaths (13·8 per cent.) were attributed to hæmorrhage, and this figure tallies very closely with the 12 per cent. given by Sir John Fraser (1938).

CAUSE OF HÆMORRHAGIC TENDENCY

My observations lead me to believe that one or more of the following factors may be concerned in the hæmorrhagic tendency:—

(1) Delayed coagulation of the blood.
(2) The formation of a soft friable bulky clot, which does not retract well.
(3) Fragility of the capillary blood-vessels, similar to that seen in scurvy, but not amenable to treatment by vitamin C or P.

Of these three factors by far the most constant is the impaired coagulability of the blood. Often this is reflected in the coagulation-time, which, when estimated by the ordinary clinical methods, may be lengthened to 10, 15, or even 20 min. In other cases, even though the coagulation-time appears normal, the prothrombin test described below will reveal a potential impairment of clotting.

The cause of the faulty coagulation in jaundice has been much discussed. It has been widely attributed to a deficiency of calcium, which is "fixed" by bile pigments and thus rendered unavailable for coagulation; but so far there has been no real evidence that lack of calcium is responsible. Moreover, administration of calcium has never been shown conclusively to reduce the clotting-time, though it is still used for this purpose in many surgical clinics. Recent work, initiated by Quick and his colleagues (1935) in Milwaukee, makes it clear that the essential factor is a deficiency of the prothrombin content of the blood. It appears that normal blood contains an excess of prothrombin and there may thus be a considerable deficiency without much effect on the coagulation-time as estimated by the ordinary methods; but when the prothrombin level falls below a critical level the hæmorrhagic tendency quickly becomes manifest. This explains the common experience that a jaundiced patient whose preoperative blood-coagulation time is normal may develop hæmorrhages a few days later, when operation has reduced the prothrombin level to a dangerously low level.

FACTORS CONCERNED IN PROTHROMBIN DEFICIENCY

In seeking the cause of the prothrombin deficiency in jaundice we must bear in mind that a similar prothrombin deficiency has also been shown to be responsible for the hæmorrhagic tendency observed in certain cases of external biliary fistula, in which the whole bile secretion is lost for a long period. Fig. 1 illustrates such a case, the history being as follows:—

A woman, aged 70, referred to me with a short history of progressive painless jaundice, proved to have a carcinoma of the pancreas. In view of her critical condition, I performed a simple cholecystostomy, thus draining the bile externally. The jaundice gradually faded, and fifteen weeks later a cholecystgastrostomy was performed, to direct the bile once again into the alimentary tract. As fig. 1 shows, while the external fistula was maintained the prothrombin index was persistently low (about 40 per cent. of the normal), but within a week after directing the bile into the stomach the prothrombin index had risen to the normal level.

Thus a prothrombin deficiency is found in two distinct conditions: jaundice and biliary fistula. Now it is clear that one important feature which these two conditions have in common is that no bile reaches the alimentary tract: in one case it is dammed back in the bile passages, and in the other it escapes externally, and thus its digestive value is lost. This suggests that the prothrombin deficiency may be due to faulty absorption of some substance from the intestinal tract owing to the lack of bile.

It is known from the earlier work of Dam (1935), in Copenhagen, that a hæmorrhagic diathesis which occurs in young chickens and is associated with a diminished prothrombin content is due to a deficiency of the *Koagulation-vitamin* or vitamin K. From this work it was an easy step to assume that a similar deficiency of vitamin operated in jaundice—not in this case because of deprivation from the diet but because of faulty absorption in the absence of bile. Butt, Snell, and Osterberg (1938) and other workers in America have accepted this view, and the cases I report below appear to give some support for it. It

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seems likely that besides the difficulty in absorbing the vitamin another factor is concerned—the factor of liver damage. It is not yet understood fully what part the vitamin plays in the synthesis of prothrombin, but there is some evidence to suggest that this process takes place in the liver. In jaundice, in which the liver is so obviously damaged, it seems possible that there is not only impaired absorption of the vitamin from the alimentary tract but also impaired synthesis or storage of prothrombin in the liver. This would account for the fact already referred to, that the prothrombin deficiency appears to run parallel with the

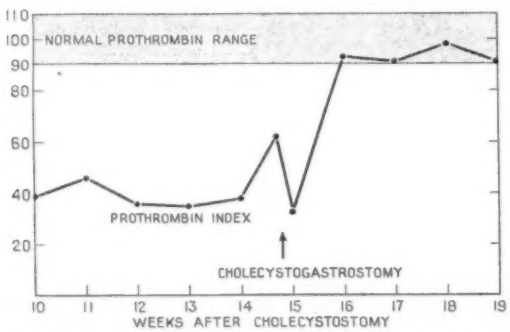

FIG. 1—Chart of prothrombin index in complete external biliary fistula after cholecystostomy for carcinoma of pancreas, showing return to normal range after cholecyst-gastrostomy.

liver damage. Much work has been done in recent months, especially in America, to determine the distribution and chemical nature of the vitamin. It appears to be widely distributed in various foodstuffs and has been obtained in greatest amount from alfalfa grass. It is fat-soluble, and the work of Klose and his colleagues (1938) suggests that it is a complex unsaturated hydrocarbon.

In the work reported here I have attempted to answer three questions:—

(1) Is there a prothrombin deficiency in jaundice, and if so does it bear any relation to the depth or duration or type of the jaundice, to the amount of liver damage, or to any other feature?

(2) Is such a prothrombin deficiency to be regarded as a trustworthy criterion of the hæmorrhagic tendency?

(3) Can the hæmorrhagic tendency be prevented or cured by the administration of vitamin K?

PROTHROMBIN ESTIMATIONS IN JAUNDICE

I have used the prothrombin test described by Quick et al. (1935). Briefly, this is a form of blood-coagulation test, so modified as to act as a test of the prothrombin content of the blood. According to the generally accepted theory of blood coagulation, prothrombin, which is a normal constituent of the plasma, is activated by thrombokinase or tissue extract in the presence of calcium to form thrombin, which then converts soluble fibrinogen into insoluble fibrin or clot. The aim of Quick's method of estimating prothrombin is to supply an optimal amount of all the substances required for coagulation except prothrombin; the coagulation-time of the resultant mixture will then be inversely proportional to the amount of prothrombin present. The technique is not difficult. Blood from a vein is oxalated to permit transfer to the laboratory. It is then recalcified by adding an excess of calcium chloride, and an excess of thrombokinase is supplied in the form of an extract of brain. We already know that fibrinogen is present in adequate amount—and I have confirmed it in all the cases in this series—hence the only variable is prothrombin. Under these conditions normal blood clots very rapidly—in 20–40 sec., varying with the sample of brain—whereas blood deficient in prothrombin may take three or four times as long to clot. The prothrombin index is then estimated as a percentage of the normal. Thus, if normal blood takes 30 sec. to clot and jaundiced blood takes 60 sec., the prothrombin index is 50 per cent. This figure is to be regarded merely as an index, not as an accurate quantitative measure of the prothrombin present.

The venous blood is obtained by syringe, and 4·5 c.cm. is added immediately to 0·5 c.cm. of a M/10 solution of sodium oxalate in water. The oxalated blood can be stored for two or three days (not longer) in a refrigerator.

The preparation of thrombokinase is made from brain tissue, obtained conveniently from the autopsy room. After removal of the meninges and vessels, the brain is thoroughly washed to remove all blood and is pulped and ground into a uniform paste. It is then spread in a thin layer over sheets of glass and dried by a hot electric blower. The dried brain is scraped off and stored in a well-stoppered bottle. Its thrombokinase activity does not appear to deteriorate with keeping. Immediately before use, 2 g. of the dried brain is emulsified in 10 c.cm. of physiological saline solution and incubated for 15 min. at 37° C., after which it is filtered through gauze to remove coarse fragments.

The calcium solution consists of M/40 calcium chloride in distilled water. It should be made up in bulk and stored for a few days before use.

For the estimation, 0·1 c.cm. of blood plasma and 0·1 c.cm. of the brain emulsion are pipetted into a clean dry test-tube, and 0·1 c.cm. of calcium chloride solution is then added, and the tube is immediately immersed in a water bath at 37° C., where it is shaken vigorously for a few moments and then rocked gently until the mixture coagulates. The time in seconds (measured by stop-watch) from the moment of adding the calcium to the moment of coagulation constitutes the prothrombin-time, and by comparing this with the clotting-time of a control plasma (which should preferably be estimated at each sitting) the prothrombin index may be obtained.

Unlike the ordinary blood-coagulation test, this estimation is highly satisfactory. It is simple to carry out, the end-point is exact, and the figures obtained in consecutive estimations are remarkably constant. Thus in my last 54 control observations on normal bloods, using thrombokinase solution from a single batch of dried brain, the prothrombin-time was invariably between 25 and 35 sec. and in the great majority between 28 and 32 sec. Compared with this normal range, the figures obtained in jaundiced patients commonly exceed 75 or even 100 sec.

I have now carried out prothrombin estimations in twenty cases of jaundice, with about 200 observations on normal bloods as controls (table II). In eight of the cases the jaundice was toxic, varying from mild catarrhal jaundice to fulminating, and in one case fatal, toxæmia. Table II shows that six of the eight cases presented a prothrombin deficiency, of slight degree in the majority, but severe in a few, and in one case, the fatal toxic one, with as low an index as 24 per cent. In the remaining twelve cases the jaundice was due to some form of malignant obstruction—carcinoma of the pancreas in the majority—and in this series all except one showed a prothrombin deficiency, which in the majority was of severe degree. The prothrombin deficiency was considerably more

severe in obstructive jaundice than in toxic jaundice. Table II shows that in general the prothrombin deficiency tends to be most evident in long-standing deep jaundice (cases 17, 18, and 19). There are, however, exceptions to this general rule, and sometimes a surprisingly low prothrombin index is obtained in a case of short duration or in one with comparatively slight icterus, whereas the converse holds true that

TABLE II—PROTHROMBIN INDEX IN JAUNDICE

Case	Prothrombin index (per cent.)	Duration of jaundice (weeks)	Depth of jaundice (icteric index)
	TOXIC JAUNDICE		
1	107	2	32
2	98	3	140
3	91	2	45
4	76	2	70
5	74	6	64
6	63	6	104
7	55	4	50
8	24	1	95
	MALIGNANT OBSTRUCTIVE JAUNDICE		
9	100	4	125
10	83	2	120
11	83	2	55
12	80	3	50
13	71	2	76
14	70	3	125
15	58	6	130
16	54	12	75
17	52	7	140
18	46	6	82
19	23	11	175
20	18	4	65

the prothrombin index may remain normal even in the presence of severe icterus of several weeks' duration. Thus case 20, a man aged 55, suffering from carcinoma of the pancreas, whose jaundice had appeared only four weeks previously and was of only moderate depth, presented the remarkably low prothrombin index of 18 per cent.; whereas case 9, a man of 59, suffering from the same disease and clinically very similar but with deeper jaundice, presented a normal prothrombin figure. These discrepancies may perhaps depend on differences in the amount of liver damage. Liver-function tests are notoriously unreliable, and I have not carried them out as a routine, but the clinical evidence in my series of cases suggests that liver damage is one of the factors concerned in reducing the prothrombin content of the blood.

PROTHROMBIN ESTIMATIONS AS A CRITERION OF HÆMORRHAGIC TENDENCY

It is well known that the tests for blood coagulability in clinical use are of very limited value in estimating the risk of postoperative hæmorrhage in jaundice. Not only does the blood-coagulation time, as judged by such tests, vary between wide limits in normal subjects, and even in the same subject at successive estimations, but also it is a common experience that in jaundice a postoperative hæmorrhagic tendency may develop in a patient whose coagulation-time is well within the limits of the normal. I have had four such cases—patients with preoperative coagulation-times of 2½–5 min., who subsequently developed serious hæmorrhages. Nor can the various modifications of the tests for bleeding-time and coagulation-time—e.g., those suggested by Lee and Vincent (1915) and Ivy and others (1935)—be judged more satisfactory.

It is difficult to dogmatise on the brief experience of twenty cases, but my impression is that in the prothrombin test we have a method which may well prove to be a trustworthy criterion of the hæmorrhagic tendency. Only three of the twenty cases in my series have had hæmorrhages, and in one of these the hæmorrhage was trivial. It is significant, however, that all three cases had a considerable deficiency of prothrombin (the preoperative figures were 58, 23, and 18 per cent.), whereas in cases in which the deficiency was less no hæmorrhagic tendency developed. The two cases already referred to (cases 9 and 20 in table II) illustrate well the value of the prothrombin test in assessing the risk of hæmorrhage.

CASE 9 was a man aged 59, suffering from jaundice due to carcinoma of the pancreas. On admission his prothrombin index was 100 per cent.; while he was under observation it never sank below 75 per cent. I therefore felt confident in recommending operation and in performing a cholecyst-gastrostomy. After the operation he showed no tendency towards hæmorrhage and made an uninterrupted recovery.

CASE 20 was a man aged 55, who also suffered from carcinoma of the pancreas, but in his case the prothrombin index on admission stood at the very low figure of 18 per cent. It was clear that, if we had embarked on an immediate operation, there was a strong probability that he would develop postoperative hæmorrhages, and, even in spite of preliminary treatment which had the effect of raising his prothrombin index to 50 per cent., he did, in fact, present a somewhat trivial hæmorrhage from the wound on the second day after operation. This patient's further history is given later in this paper, when it will be seen that he subsequently came to operation again, and again developed postoperative hæmorrhage from the wound, the prothrombin index at that time being 32 per cent.

Thus it appears likely that the prothrombin estimation will prove a valuable method of assessing the hæmorrhagic tendency.

PREVENTION OF HÆMORRHAGE BY ADMINISTRATION OF VITAMIN K

In four of the cases in my series I have made observations on the effect of administering vitamin K. The preparation used has been Cerophyl, prepared by the American Dairy Company and supplied to me through Messrs. Glaxo. This preparation contains vitamins A, B, and C, and doubtless other factors; hence some caution is necessary in interpreting the beneficial results obtained as due to vitamin K.* It has not yet been possible to produce this vitamin in purified form in sufficient quantity for clinical work. Owing to the difficulty in obtaining a sufficient supply of the cerophyl, I have been able to treat only a small number of cases in this way, but this has to some extent been counterbalanced by the fact that each case has been the subject of a close study, with observations on the bleeding-time, the coagulation-time, and many biochemical estimations. For the purpose of this paper, it is not necessary to report all the observations in detail, and I propose merely to give such summaries as indicate the extent to which the administration of vitamin K has been of value. It may be stated first that the results of this treatment, although somewhat variable, have on the whole been satisfactory in three cases but completely ineffective in the fourth, a case of external biliary fistula. The following are the details of the three cases in which the vitamin proved effective.

CASE 15.—This is the first case in which the vitamin was given, and, in a sense, it was experimental; but,

* Isolated observations made since this paper was written lead me to suspect that the results described may be due to some substance present in the crude extract other than vitamin K.

although the issue was fatal, some benefit appeared to be derived from the vitamin. The patient was a woman aged 50, who was admitted to hospital deeply jaundiced. She had previously had one breast removed for carcinoma, and the jaundice was due to the pressure of a solitary metastasis on the common bile-duct. On admission to hospital she had a prothrombin index of 58 per cent. (fig. 2). Cerophyl was not available then, so she was given 5 oz. of bile daily by stomach-tube in the hope that it might promote the absorption of sufficient vitamin from the ordinary diet to influence the prothrombin content.

This treatment, however, proved insufficient, perhaps because in conditions of liver damage a great excess of vitamin is required. At this stage a supply of cerophyl was obtained and was given over a period of sixteen days. This raised the prothrombin index almost to the normal range, in spite of the fact that the jaundice was becoming deeper and the patient's general condition increasingly grave. At this stage it was decided to perform a laparotomy; the malignant mass was detected, and the gall-bladder was drained externally. However, the patient did not improve after the operation. There was evident impairment of liver function, and she died a week later. No bleeding was noted until the third day after operation, but from then until death there was oozing from the wound, which persisted more or less continuously in spite of a small transfusion.

It is noteworthy that in this case the prothrombin level was not maintained after operation but sank rapidly, and at the time of the postoperative bleeding it was below 50 per cent. I have observed this feature in several cases, and it appears that this is the reason for the peculiar liability to hæmorrhage in the immediate postoperative period. Two lessons are to be learnt from this case. The first is that administration of the vitamin should be continued after operation, especially if there is much liver damage, for only in this way can the prothrombin index be maintained over the dangerous postoperative phase. The second lesson is that an external biliary fistula should be avoided whenever possible, for the loss of bile tends to increase the prothrombin deficiency.

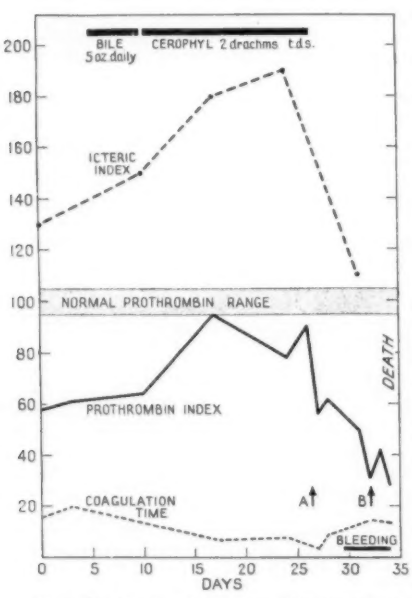

FIG. 2—Chart of prothrombin index in fatal jaundice due to malignant mass in pancreas secondary to breast carcinoma (case 15). A, cholecystostomy; B, transfusion.

CASE 20.—In this case the administration of vitamin was more effective. This was the man aged 55 previously referred to. He was admitted with moderate jaundice, the result of a carcinoma of the pancreas.

On admission his prothrombin index was 18 per cent. (fig. 3)—the lowest figure in this series. The vitamin was given over a period of eleven days, and, although its effect was not dramatic, there was a steady rise in the prothrombin index up to 50 per cent. Operation was thought advisable at this stage, and a cholecyst-gastrostomy was performed. After operation there was again a transitory fall in the prothrombin index to 32 per cent., and at this point, on the second day, there was some bleeding from the wound. Later, however, the prothrombin index rose rapidly and within a week of operation attained the normal level.

The further progress of this case is of special interest. A fortnight after operation the prothrombin index had again fallen—to 44 per cent.—and at this stage it was also becoming obvious that the jaundice showed no appreciable improvement. The patient was kept under observation for a further period of ten days, when these findings were confirmed. It was decided

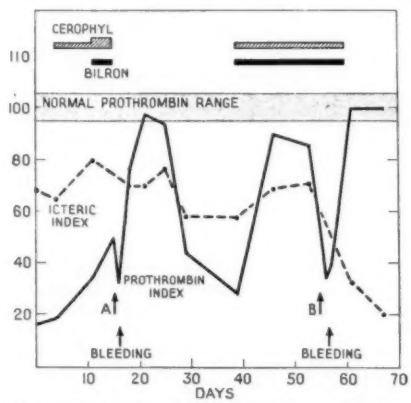

FIG. 3—Chart of prothrombin index in jaundice due to carcinoma of pancreas (case 20). A, cholecyst-gastrostomy; B, cholangiogastrostomy.

that probably the cholecyst-gastrostomy had been ineffective in relieving the jaundice owing to encroachment of the growth up the common duct and involvement of the termination of the cystic duct. The patient was therefore advised to undergo a second exploration. Before proceeding with the operation a further period of treatment with cerophyl was given. In this instance a preparation of bile-salts (Bilron) was also given, to promote the absorption of the vitamin. Fig. 3 shows that the effect was a rapid increase in the prothrombin content, which attained 90 per cent. by the end of one week and maintained this level for a further period of a week.

The second operation was now carried out and the provisional diagnosis confirmed. Accordingly the common duct above the growth, which was much dilated, was anastomosed to the stomach. This proved effective in relieving the jaundice, which rapidly faded. The prothrombin index again diminished after operation, falling to 32 per cent., and at this stage again on the second postoperative day there was a free hæmorrhage from the wound, necessitating packing with adrenaline gauze. Later, however, the prothrombin index rose again, and within a week of operation it attained a normal figure, where it remained during the patient's subsequent stay in hospital.

CASE 18 was a man aged 60, who had suffered from jaundice, painless in origin and progressive, of seven weeks' duration. He was admitted to the Royal Infirmary, Edinburgh, under the care of Dr. W. A.

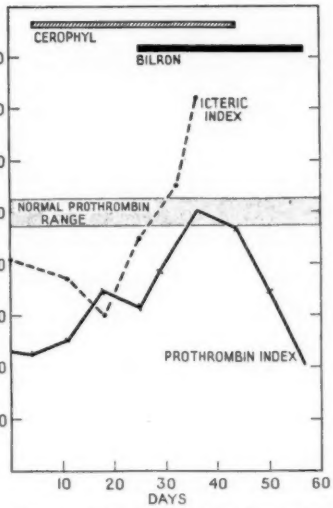

FIG. 4—Chart of prothrombin index in obstructive jaundice thought to be due to carcinoma of pancreas (case 18).

Alexander, to whom I am indebted for permission to carry out the investigation. The case is believed to be one of carcinoma of the head of the pancreas, but no operation was performed, and the patient left hospital before the diagnosis could be confirmed.

On his admission to hospital the prothrombin index stood at 46 per cent. (fig. 4). Cerophyl was administered, and slight improvement in the prothrombin content was obtained, the index being raised in a fortnight to 70 per cent. At this point the bile-salt preparation (bilron) was added to promote absorption of the vitamin, and within ten days the prothrombin index was raised to the normal level and was maintained at this level for a further period of one week. At this stage, when it was decided not to advise operation, the cerophyl was discontinued, the administration of bilron, however, being maintained. The result was a rapid fall in the prothrombin, which at the end of fourteen days had regained its original level of just over 40 per cent.

From this case, it seems clear that the improvement in the prothrombin index was attributable to the vitamin preparation.

SUMMARY

(1) Hæmorrhage is a not uncommon and often fatal complication after operations on jaundiced persons.

(2) The hæmorrhagic tendency is attributable to a prothrombin deficiency, which is most noticeable during the few days after operation.

(3) The prothrombin deficiency appears to be associated with faulty absorption of a vitamin owing to the absence of bile from the alimentary tract. There is evidence to suggest that another factor is the faulty utilisation of the vitamin as a result of liver damage.

(4) Estimation of the prothrombin content of the blood appears to be a useful method of assessing the risk of hæmorrhage. To ensure reliable results the test should be carried out not only before operation but also afterwards, and any sudden fall in the prothrombin index at this time should be regarded as a danger-signal.

(5) The risk of hæmorrhage in jaundice may be reduced by the administration of preparations containing vitamin K. This should be done for a sufficient period before operation to remedy the prothrombin deficiency, and the administration should be continued later until the dangerous postoperative period is past.

(*References at foot of next column*)

SODIUM AND CHLORINE RETENTION WITHOUT RENAL DISEASE

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DURING the last few years several patients not suffering from renal disease have been observed in whom a very high level of sodium and chloride was found in the blood, with nearly complete absence of these elements from the urine. The data are in many ways incomplete but seem of sufficient interest to publish. The chemical findings in each case are given in the table.

CASE-HISTORIES

CASE 1.—Caretaker, aged 38. Admitted to hospital following hæmatemesis. He had been taking an alkaline powder for indigestion. He was dehydrated and drowsy, and died in spite of transfusion and intravenous administration of 1 litre of distilled water as soon as the results of the blood analysis were known (von Farkas 1934). *Post mortem:* Cirrhosis of the liver, with œsophageal varices. The kidneys were normal on naked-eye examination; histologically there was a very occasional fibrosed glomerulus, but the great majority of glomeruli were healthy; there was definite degeneration in the tubules, particularly of the distal segments.

CASE 2.—Housewife, aged 66. Admitted suffering from headache, vomiting and paraplegia. She was drowsy, with spastic paralysis of both legs and left arm. Blood-pressure 155/75. *Post mortem:* A large cerebral hæmorrhage between the frontal lobes from a ruptured aneurysm of the left anterior cerebral artery. Marked atheroma. Hypertrophy of the heart. Kidneys showed very slight ischæmic fibrosis; the majority of the glomeruli appeared healthy but there was some tubular degeneration.

CASE 3.—Radio-dealer, aged 55. Vague history of illness for one week, with development of left hemiparesis; had been taking an alkaline powder for indigestion. Blood-pressure 136/70. No hæmatemesis, but passed large melæna stool after admission. *Post mortem:* Recent softening of right internal capsule. Ulcer in first part of duodenum. Kidneys showed a slightly granular surface when capsule was stripped; sections showed occasional fibrosed glomeruli with some tubular degeneration.

CASE 4.—Child, aged 4 months. Sent in as a case of postvaccinal encephalitis. Very drowsy; bulging fontanelle; would not feed; dehydrated. *Post mortem:* Adenoma of choroid plexus infiltrating right posterior lobe beneath the lateral ventricle. Kidneys completely normal.

CASE 5.—Child, aged 2¾ years. Admitted with complete suppression of urine, and died without

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CHEMICAL FINDINGS

—	Normal	CASE 1					CASE 2				CASE 3					CASE 4			
		Serum		Urine		Clearance	Serum		Urine		Serum		Urine		Clearance	C.S.F.		Urine	
Na	*140*	384	*167·0*	15·5	*6·7*	..	349	*153·0*	6	*2·5*	374	*162·5*	12	*5·0*	..	382	*166*	21	*9*
K	*5*	12·5	*3·2*	282	*72·0*	6·2	13·5	*3·5*	264	*68·0*	16·9	*4·3*	104	*26·5*	5·8	..	..	436	*111*
Ca	*5*	8·4	*4·2*	—	—	..	10·7	*5·3*	6	*3·1*	13·6	*6·8*	6·9	*3·5*	..	..	..	..	..
Mg	*2*	5·6	*4·7*	2·5	*2·0*	..	3·5	*2·9*	—	—	3·7	*3·0*	5·5	*4·6*	..	..	..	..	..
T.F.B.	*152*	..	*179*	..	*81*	..	..	*165*	..	*74*	..	*177*	..	*40*	..	..	..	..	..
Cl	*100*	492	*138·8*	2·1	*0·6*	..	425	*119·6*	21	*5·9*	381	*107·5*	0	*0*	..	533	*150*	trace	..
P	*2*	4·8	*2·8*	51	*16·0*	2·9	3·1	*1·8*	91	*29·4*	2·8	*1·8*	31	*10·0*	10·4	..	..	..	..
HCO_3	*27*	45·0	*20·2*	..	..	..	49·1	*22·2*	..	..	88·5	*39·8*	..	..	..	..	..	..	..
S	..	..	..	192	*120·0*	36*	..	..	198	*124·0*	3·4	*2·1*	111	*71·0*	35	..	..	237	*148*
T.P.	*16*	5·9	*13·2*	trace	..	..	5·9	*13·9*	..	..	6·6	*16·3*	..	..	..	..	..	..	..
T.A.	*145*	..	*173*	..	*137*	..	..	*158*	..	*159*	..	*168*	..	*81*	..	..	..	..	..
Urea	..	220	..	2100	..	5·5	105	..	4000	..	345	..	2750	..	7·7	68	..	..	..
pH	..	..	..	5·5	..	..	..	..	acid	..	..	..	5·4	..	..	..	..	..	..
Output c.cm. per min.	..	..	..	0·28	..	..	..	..	..	..	..	..	0·9	..	..	..	..	..	..

T.F.B. = Total fixed base (sum of all determined bases).
T.A. = Total determined acids.
T.P. = Total protein (g. per 100 c.cm.).
Figures in roman type represent values in mg. per 100 c.cm. except protein, which is given as g. per 100 c.cm. and bicarbonate which is given as vols. per 100 c.cm.
Figures in italics represent values in m. Eq. per litre: in the case of phosphate the basicity of phosphoric acid has been calculated as 1·8 at the pH of serum, and as 1·0 in the strongly acid urines; in the case of protein the figure is calculated as the sum of the separate values (not recorded here) of albumin and globulin.
"Clearances" are calculated directly as c.cm. blood cleared per minute: in the case of urea only the square-root formula has been employed.
* Assuming serum-sulphur as 1·5 mg. per 100 c.cm.

re-establishment of urine flow. This case is included because, although there were no chemical observations except a high and rising blood-urea, it may possibly represent an extreme example of the same condition. *Post-mortem* showed extensive tuberose sclerosis of the brain. Kidneys completely normal.

The principal findings in all cases were high sodium and chlorine in the serum, with a high blood-urea. The urines all showed very low sodium and chlorine, with high concentrations of potassium, phosphate, sulphate and urea; all were strongly acid, even in case 3 where the patient was suffering from alkalosis. Except in this last case there was no evidence of disturbance of the usual acid-base relationships in the serum. The fairly close agreement between the values for total fixed base and total determined acids shows that there is no accumulation of "undetermined acids" such as occurs in uræmia due to chronic nephritis. The differences in the three cases reported here were 6, 7 and 9 m.Eq. per litre; in uræmia values of 20 m.Eq. per litre and upwards are usually met with. The kidneys in general showed normal glomeruli, apart from very slight focal ischæmic fibrosis, but some showed tubular degeneration.

DISCUSSION

The mechanism by which this condition originates is not clear. All the patients, it is true, showed to some extent the clinical symptoms of dehydration, but most patients with dehydration do not show this accumulation of sodium and chlorine in the blood. All the patients, except one whose brain was not examined post mortem, had a lesion in the central nervous system; the lesions were very varied in nature and distribution and it is difficult to find any factor common to them all. Starling and Verney (1924) have shown that the excretion of chloride and water is largely under the control of a pituitary hormone, and in the absence of this hormone there occurs a diuresis with a very low concentration of salt even with high chloride in the plasma; by the administration of this hormone the concentration and absolute amount of chloride excreted rises very much. It seemed possible that the varied intracranial lesions might in some way act through interference with the secretion of this hormone. The recent observations of Ebbs (1937) that there is often a very high cerebrospinal-fluid chloride level† in cases of spontaneous cerebral venous sinus thrombosis in children would fit in with the hypothesis that some lesion of the central nervous system may be indirectly responsible for the condition. Ebbs stresses the fact that there was no evidence of dehydration of his patients at the time of onset.

It is well known that abnormalities in the urinary secretion may arise after intracranial accidents—e.g., the albuminuria after subarachnoid hæmorrhage—and a number of patients with cerebral hæmorrhage and other intracranial accidents have therefore been investigated, but the retention of sodium and chloride has not been found to be a general phenomenon in these conditions.

Another hormone which is known to influence the excretion of sodium, potassium and chloride is that of the suprarenal cortex, the metabolic changes in patients described resembling what might be envisaged as a result of excessive cortical activity. However, this explanation seems unlikely on quantitative grounds, for even very massive doses of cortical extract have effects which are slight compared with the nearly complete absence of sodium and chloride from the urine (Harrop and Thorn 1937).

Borst (1938) has described a similar retention of chloride and sodium with high levels in the blood in

† High cerebrospinal-fluid chloride is always associated with high serum-chloride.

some cases of massive gastro-intestinal hæmorrhage, and ascribes the result to imperfect filling of the cardiovascular system. Actually dehydration in the ordinary sense was not always present, for some of the patients had œdema and quite large urinary outputs at the time of maximum retention. His patients at the time when the sodium and chloride excretions were lowest had normal blood-pressures, and if his explanation is correct it seems possible that this dehydration acts on the kidney indirectly through nervous or hormonal influence.

An alternative explanation arises from the demonstration by Shannon and Fisher (1938) that the tubules are capable of reabsorbing a given maximum quantity of glucose from the glomerular filtrate in a given time whatever the level of the blood-sugar. McCance and Lawrence (1935) and others have shown that in some cases of diabetic coma with very high blood-sugar values there may be no or a negligible glycosuria: this usually occurs in patients with very low urine output, and in view of Shannon and Fisher's work, the explanation may be that the glomerular filtration-rate is so low that the tubules are capable of reabsorbing all the sugar in the glomerular filtrate even when the blood-sugar is high. This explanation has been put forward as a possibility by McCance and Widdowson (1939).

About the excretion of potassium very little is known, but even if it is admitted that some of the phosphate, sulphate, and urea is excreted by the tubules, which is by no means definitely proved, the excessive reabsorption of sodium and chlorine with high serum sodium and chlorine levels remains to be explained. There is at present no evidence as to whether a mechanism similar to that shown by Shannon and Fisher to regulate the excretion of glucose operates in the case of any electrolytes. If such a mechanism does operate it might be possible, by assuming a low glomerular filtration-rate, which seems likely from the low urea-clearances, to account for the disappearance of the sodium and chlorine, but even so it is still not obvious why the other electrolytes—potassium, phosphate, and sulphate—are excreted in such high concentration.

Case 3 is of particular interest, for in spite of the alkalosis this patient had a strongly acid urine. McCance and Widdowson (1936) have suggested that the acid urine found in some cases of alkalosis is due to a deficiency of fixed base available for excretion: this explanation does not cover a case such as this, in which there is gross excess of base in the serum, but little in the urine. Maizels and McArthur (1930) have also reported a series of cases of diarrhœa and vomiting with dehydration in infants, in which the urine was acid and contained little chloride in spite of a high bicarbonate and chloride concentration in the plasma.

The explanation seems to be either that the tubules handle chloride and sodium in a similar manner to glucose, and reabsorb up to a certain maximum quantity per unit time, whatever the level in the blood, or that there is some abnormality in the nervous or hormonal influences acting on the kidneys. It is hoped in any future case to obtain further information as to the mechanism by means of the inulin clearance as a measure of glomerular filtration-rate, and organic iodine clearance as a measure of the renal blood flow.

SUMMARY

A number of patients have been observed in whom there was nearly complete absence of sodium and chloride from the urine, with very high levels in the blood. Other electrolytes were dealt with normally. There was no evidence of renal disease sufficient to account for the condition, but all cases where the brain was examined post mortem showed some lesion of the central nervous system. It is suggested either that the tubules reabsorb sodium and chloride independent of their concentration in the blood up to a definite maximum quantity per minute, or that there is an abnormality in the nervous or hormonal control of the kidneys.

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TRENDELENBURG'S OPERATION FOR PULMONARY EMBOLISM

A SUCCESSFUL CASE

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IT is now just over thirty years since Prof. Friedrich Trendelenburg, already a veteran surgeon of 64, embarked on his endeavours to evolve an operation for pulmonary embolism. After much work on the cadaver, followed by animal experiments, he wrote:—

"The operation in the calf, on account of the form of the thorax, the situation of the pulmonary artery, and the intercommunication of the pleuræ, presents much greater difficulty than in man. It is therefore greatly to be hoped that, sooner or later, a successful case in the human will follow this successful operation in an animal."

That was in 1908. In his animal experiments at Leipzig, Trendelenburg used long sterile strips of lung tissue, which were introduced into the internal jugular veins of calves. Carried by the blood-stream to the heart, the strip then blocked the pulmonary artery. Eventually he was able to operate successfully for this experimental embolism, and he and his team of assistants determined to "try their hand at raising the dead"—those patients struck down suddenly and unexpectedly when recovering from an operation, a fracture, or childbirth. Continental surgeons received this daring proposal with surprise and doubt.

Trendelenburg's first case died in the operating-theatre. The second however, operated on by Sievers, his assistant, lived 15 hours and died of "heart failure." The third, operated on by Trendelenburg himself, lived for 37 hours, dying tragically of hæmorrhage from the internal mammary artery.

Within the next year or so a number of European surgeons, with more keenness than sense according to some of their elders, tackled these forlorn hope cases. Among them must be mentioned Schumacher, Sauerbruch, and Krüger, a pupil of Trendelenburg.* Krüger's case (1909) gave hope that at last a human

* Only a minimum number of references are quoted in this article; they have already been given fairly fully—e.g., in Sauerbruch's "Chirurgie der Brustorgane" and Sauerbruch and O'Shaughnessy's "Thoracic Surgery."

patient might indeed be saved, for the patient lived 5¼ days, dying of infection of the left pleura. It is not surprising that these repeated disappointments led to the undertaking coming to be looked upon as hopelessly difficult and formidable—not a practical proposition, as Finney dismissed it.

Trendelenburg lived to see Kirschner in April, 1924, show a successful case before the congress of the German Surgical Society in Berlin (Kirschner 1924), but he died at the end of the same year. Kirschner, who was then professor of surgery at Königsberg, carried out the operation exactly as laid down by the master, removing the second cartilage, tying the internal mammary vessels, and opening the left pleura. After this dramatic and belated vindication, surgeons were once again stimulated to undertake the operation, again to be met by a crop of disappointments. However, in 1927, Meyer of the Krankenhaus Westend, Berlin, published another successful case and moreover described his very important improvements on the operation. He showed how, by removing the third as well as the second cartilage and by dissecting behind the inner end of the fourth cartilage, it was possible to incise the bare area of pericardium, and then by his special two-index manœuvre, tear open the pericardium reflecting with it the pleural sinus intact. In this way the operation becomes a special variety of anterior mediastinotomy, with great advantages both immediate and late. Meyer altogether had four successful cases, before his tragic death in November, 1933. It is to Meyer's work and brilliant successes that the operation owes its position today. The following five surgeons have had successful cases: Kirschner of Königsberg (1), A. W. Meyer of Berlin (4), Nyström of Uppsala (2), Crafoord of Stockholm (3), and Valdoni of Rome (1). It may be convenient here to give a chronological list of the previous eleven cases.

Date	Case	Reference
March 18, 1924	Kirschner's	Kirschner 1924
Feb. 9, 1927	Meyer's first	Meyer 1927
March 15, 1927	Meyer's second	Meyer 1928a
Sept. 23, 1927	Crafoord's	Crafoord 1928
Feb. 4, 1928	Nyström's first	Nyström 1928
Feb. 10, 1928	Meyer's third	Meyer 1928b
Oct. 11, 1928	Crafoord's second	Crafoord 1928
Jan. 23, 1929	Nyström's second	Nyström 1930
Feb. 24, 1931	Meyer's fourth	Meyer 1931
Jan. 4, 1933	Crafoord's third	Crafoord 1939
Nov. 27, 1935	Valdoni's	Valdoni 1936

CASE-RECORDS

A woman of 49 was admitted to the North Middlesex County Hospital on Aug. 9, 1938, with an infected prepatellar bursa (left). A routine examination of lungs, heart, and abdomen revealed no abnormality. She was a strong, tall woman, and very heavy, weighing 15 st. (100 kg.) on admission. She had had no illnesses except influenza and colds. She had had three children (two alive), the youngest being 19.

The inflamed bursa was fomented for two days, and on the 11th was incised under an anæsthetic. The pus contained *Staphylococcus aureus*. The knee made good progress, but on the 19th the leg became tense and œdematous below the knee owing to phlebitis of the internal saphenous vein. 31st: complained of pain over lower left ribs. Chest moved well on respiration. Percussion note good. No adventitious sounds. Sept. 2: Still complained of pain in lower part of chest. Diminished air entry and occasional crepitations left lower lobe. 5th: Sputum slightly bloodstained. Evidently an infarct. 8th: Still complained of pain. Pyrexia. 10th: Impaired percussion note and diminished breath-sounds, bronchial in character, left base. Still blood-stained sputum. 12th: Complained of sudden inability to get breath. Greyish-blue lips. Obviously pulmonary embolism. Had been talking normally to patient in the next bed when she suddenly sat up and said, "Staff, I can't breathe. I feel faint," and grasped her throat. This was at 10.50 A.M. She complained of pain in the left chest and was blue. 11.5 A.M.: Blue and sweating a good deal. Taken down to theatre on trolley and instruments got out. (A sterile Trendelenburg tray is always kept ready.)

TRENDELENBURG'S OPERATION

Operation 11.30 A.M. (assistant, Mr. Galloway, jun.). Incision made at leisure under local infiltration; 2nd and 3rd costal cartilages freed and removed. Owing to laboured respiration great care had to be taken of the pleura, which bulged dangerously between the cartilages. Triangularis sterni cleaned off back of 4th costal cartilage and margin of sternum. We then waited as patient was not yet in articulo mortis. Presently pulse completely disappeared, and respiration became reduced to irregular gasps. As soon as patient was in articulo (12.10 P.M.) pericardium was incised and split up by Meyer's manœuvre reflecting the pleura safely with it. Heart had ceased to pulsate and only twitched irregularly. Trendelenburg's sound passed and rubber tourniquet tightened around great vessels. Pulmonary artery incised for 2 cm., producing gush of blood: owing to tension of pull on rubber and escape of blood it was very difficult to find the incision with the Trendelenburg thrombus forceps. With first insertion of forceps a large one-piece clot 16 in. (40 cm.) long was pulled out (fig. 1). Lips of incision clamped. Heart massaged; adrenaline 1 c.cm. into sinus aortæ. Beat came back, at first feebly and then regularly. Respiration did not, but oxygen under positive pressure administered all the time with McKesson apparatus by Dr. Patrick Nagle. Lobeline into aorta. Breathing started at once, but 6 min. since it had stopped. The circulation had probably been absent for about 3 min. Heart became strong and regular and patient a good colour. Continuous catgut size 1 for the artery suture, round and round the forceps and then tied after removing forceps, with some more loss of blood, but this was well controlled. Gauze packing left in. Skin sutures. Patient breathing well and pulse very fair on leaving theatre for oxygen tent. 2.30 P.M.: Good colour. Breathing well in oxygen tent, but had several clonic fits of arms and face; evidently cerebral anoxæmia had lasted too long. Fits continued during afternoon, some lasting as long as 10 min. Eventually relapsed into uneasy sleep. Had not regained consciousness.

FIG. 1—Clot removed from pulmonary artery (slightly shrunken), with scale of inches.

13th: In morning patient began to answer questions and ask for things. Only worry was that she could not see. Continued to improve cerebrally. Pulse 116–130; volume tended to vary with alternate beats. Towards evening I removed gauze packing; a good deal of serum escaped, but no blood. As patient was obviously anæmic 650 c.cm. of citrated blood was given between 10 and 10.45 P.M. Patient was very bright, and in a curious mental state of slightly fatuous repartee. She would discuss her family, her friends, the hospital staff, or her fellow patients with complete frankness and absence of reserve. No

reaction from transfusion and it was decided to fix her upright in the oxygen tent for the night. Breath-sounds good in both lungs, with few râles. At 11.10 P.M. patient suddenly went blue and said she couldn't get her breath. Pulse had almost disappeared. Extremely anxious—very like when she had her large embolus. Gradually improved in next hour; pulse became fair; answered questions; no blanching. Given morphine gr. ¼ which certainly eased her. Colour very fair later. This was evidently another clot; probably fixing her up for the night had disturbed another thrombus in the leg.

14th: Colour quite good. Pulse 120, but volume still fair. Rather restless. Wound a little moist. Chest radiogram and electrocardiogram taken in ward. Radiogram (fig. 2) showed considerable area of opacity at left base; no collapse of lung. Electrocardiogram (fig. 3): rate 125; rhythm regular, 100; P.R. lead I normal; lead I appears normal; in lead II voltage is low; T_3 is upright; one P wave appears to be inverted; T_3 is deeply inverted. (Dr. C. Allan Birch.) During day condition remained satisfactory. In the evening was given another 400 c.cm. of citrated blood, with no reaction. Could not see by artificial light. About midnight was rather restless and respiration quicker. Pulse-rate up to 130.

15th: Brighter again but temperature 101° F. and pulse quicker. Left base dull and poor air entry (see fig. 2). Much thin yellow fluid escaping from wound, so two lowest stitches removed; about 2 oz. yellow serum with some flakes came out on coughing. Re-dressed. Sight quite good again, could count fingers easily. Sulphanilamide 1 gramme four-hourly begun 11.30 A.M.

16th: Slightly "strange," and worried; called a two-shilling piece a shilling. Fluid from mediastinum reported to contain hæmolytic streptococci, which grew freely on culture. Sulphanilamide continued 1 g. four-hourly. Temperature 99° F., pulse 140, respiration 36, about the same.

17th: A little better. Radiogram of chest showed opacity left base much the same; some mottling right base; breath-sounds adequate, although, rhonchi ++ and râles. Wound: frank yellow pus, draining freely; ends of wound healing. Throat: dry and sore with some exudate on fauces.

18th: Worried by sore tongue. Streptococci now failing to grow on culture.

19th: Definitely better. Pus yellow and mucoid, and escaping profusely. Sulphanilamide reduced to 5 g. a day. Blood-count: white cells, 25,000; red cells, 4,570,000; Hb., 84 per cent. Still spent most of time in oxygen tent.

20th: Catheter passed into anterior mediastinum, dipping behind 4th costal cartilage, and connected to electric suction pump. All pus now drained by this method. General condition much the same. Right lung: few râles at base only. Dullness and silence still at left base. This was now aspirated and found to be a bloody effusion, evidently from the infarction; 400 c.cm. odourless fluid aspirated; no organisms found in it. In oxygen tent all night and most of day.

21st: Draining well into pump; 225 c.cm. in 36 hr. Skin over sacrum giving way; could not tolerate lying on side on account of difficulty in breathing.

FIG. 2—Radiogram of chest taken in bed two days after operation (Sept. 14, 1938), showing commencing effusion at left base.

22nd: Catheter had been draining pus from behind shelf formed by lower costal cartilages. By that time she had, of course, not only suppurative mediastinitis but also suppurative pericarditis. In evening, as pulse, temperature, and respiration were definitely rising, it was decided to drain pericardium. Patient taken to theatre in her bed.

DRAINAGE OF SUPPURATIVE PERICARDITIS

Operation at 8 P.M. under local infiltration with Novocain. Midline over ensiform infiltrated. Incision made downwards from previous one to tip of ensiform. Left 6th and 7th costal cartilages carefully and slowly cleaned, and an inch of each then removed bit by bit with nibbling forceps. This turned out an excellent and safe device. Superior epigastric vessels tied and cut between. Pad of fat pushed aside. Taut pericardium eventually opened by a 2 cm. vertical incision. Finger was freely introduced and much fibrin could be felt. Moderate amount of pus escaped but there was no loculation. Draining freely. Patient stood operation well.

25th: Wound kept dry with continuous suction, by a small catheter fixed at pericardial opening. *Left hæmothorax aspirated* again in 8th space posteriorly, till no more could be obtained—700 c.cm. of bloody effusion. General condition still precarious, but cerebration good, and orientation much improved. Sight recovered well; could read 1/10 in. print. Still somewhat naïve but less so.

Oct. 2: Draining about 6 oz. pus into pump daily. Getting markedly deaf. Sulphanilamide

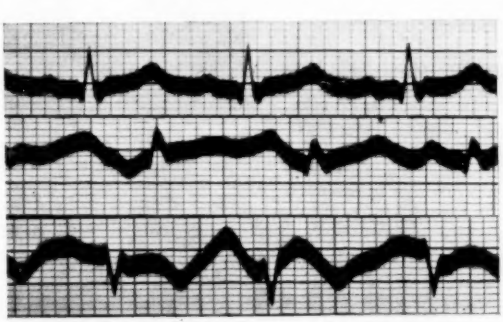

FIG. 3—Electrocardiogram two days after operation (Sept. 14, 1938).

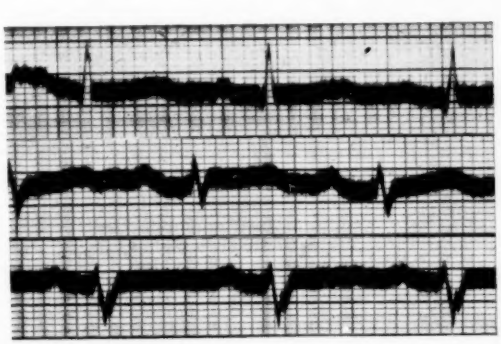

FIG. 4—Electrocardiogram on Feb. 3, 1939.

stopped. About a quarter of wound healed, rest wide open, showing auricles and roots of great vessels plainly, covered with granulation tissue. Also draining well from 7th cartilage pericardiotomy opening. Lungs: some rhonchi in right; left resonant and breath-sounds good. Pulse about 120 and quite strong. Temperature 99°–100° F.

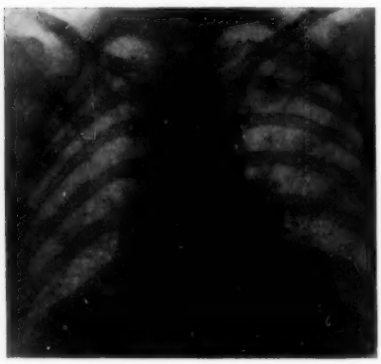

FIG. 5—Radiogram of chest on March 21, 1939, taken at 2 metres under standard conditions.

7th: Pain in left side and temperature 101°–103° F. Pleura aspirated; 20 c.cm. fluid removed, not obviously purulent. Large gangrenous area over sacrum had now sloughed.

8th: Diarrhœa for two days, improving with kaolin.

11th: Culture of fluid obtained on the 7th showed that it had now become infected, after four weeks, by hæmolytic streptococci. Infection presumably blood-borne and evidently coincided with her new pyrexia and pain in side. Fluid, at first thin pus, then bloody, aspirated from chest. General condition no change; getting thin.

12th: *Intercostal drainage of infected hæmothorax* under local infiltration by novocain in the ward. Using trocar and cannula, a No. 6 catheter was inserted in 9th space, postaxillary line. Airtight attachment to air pump with 5 cm. Hg suction.

18th: Somewhat anæmic again in spite of massive dosage with iron (gr. 90 daily). Blood-transfusion of 700 c.cm.

22nd: Intercostal drainage with pump working satisfactorily. Breath-sounds coming through well at left base. Heart wound had cleaned up wonderfully and there was now only such pus as soaked into the gauze. Temperature 99°–100° F. at night. Getting up half an hour a day. Sacral sore still large but healing a little.

24th: Blood-transfusion 550 c.cm. 27th: Stronger. Wound of mediastinum and granulations on back clean. Breath-sounds good.

28th: Radiogram of chest: opaque area in upper part clearing; collection in inner part of lower zone; dome could just be seen.

Rib resection for empyema under local infiltration. An inch of 9th rib in axillary line just below sinus resected. Flanged tube. Flat cavity with thick yellow pus, the size of adult hand. Suction to tube for 5 days.

30th: Rise of temperature and pulse 140. Put on sulphanilamide again.

Nov. 5: Temperature normal. Empyema drained 6 oz. in twenty-four hours; now thick yellow and viscid discharge. Left chest resonant down to empyema tube.

Dec. 11: Making steady and quite fast progress. Been walking around her room for a fortnight. Pericardial wound almost healed; clean granulating area ½ in. across. Empyema cavity closed. Sacral wound clean and about 2½ in. across only. Pulse regular at about 80.

15th: Worried by numbness of little and ring fingers of right hand. Cannot wring face flannel with right hand. Some weakness of muscles of the right hand supplied by ulnar nerve, with wasting. No demonstrable loss of sensation. No evidence of pyramidal lesion. Pulses equal. Wassermann reaction negative. Shoulder-girdle muscles had become wasted and flabby through the long illness. Diagnosis probably scalenus anticus syndrome.

Jan. 11: Wasting of hand progressive, with tendency to main-en-griffe in 4th and 5th digits. Not helped by physiotherapy or sling. Full of spirits and quite strong. Weight, 11 st. 6 lb. Pericardial wound very firm; one or two points of granulation size of a grain of wheat. Pyothorax healed. Sacrum: area size of penny only unhealed.

12th: *Scalenotomy* (right) under local infiltration. Approach as for phrenic avulsion. Right scalenus anticus divided just above its insertion.

23rd: Doing well. Gained 8 lb. in previous fortnight. Scalenotomy wound healed. Symptoms definitely relieved and interdigital grip stronger.

Feb. 3: Electrocardiogram (fig. 4).

March 21: Very fit. Weight 12 st. Walking about. All wounds healed except granulating area size of halfpenny over sacrum and two tiny scabs over sternum. Radiogram of chest (fig. 5).

April 6: Discharged well. Cerebration normal. Amnesia from moment she cried out "I can't get my breath," until a few days after the operation when she remembered being in the oxygen tent.

DISCUSSION

This is the first successful pulmonary embolectomy recorded outside continental Europe, and is the twelfth in the world literature. Apart from its interest as a Trendelenburg embolectomy this case presented a remarkable series of complications, almost any of which might have proved fatal of itself in such a dangerously ill patient.

Cerebral complications.—In none of the other recorded recoveries were there clonic convulsions, though several of the patients were unconscious for some hours. Crafoord's first is the only other case that developed amaurosis, although in a personal communication he informs me that his third case also "had some peculiar symptoms from the central nervous system." My patient also developed marked temporary deafness after about three weeks. The amnesia extending over the later and most distressing phase before operation, the time in the theatre, and a varying period afterwards is a feature of all the recorded cases. Crafoord's second case, however, vaguely remembered "somebody had been poking about in her chest, as in a dream, and people talking." It is presumably due to temporary suspension of the cerebral circulation and is thus comparable to the amnesia in cerebral concussion. The striking temporary psychological changes in the present case have not been recorded in any other case.

FIG. 6—The patient in March, 1939.

Second embolism.—The embolism at the end of twenty-four hours must have been a large one, but fortunately not too large to pass on into the left branch where it caused an infarct, followed by a large hæmorrhagic effusion. Meyer's second case

died from a second pulmonary embolism on the 25th day, when she was ready to get up. (This raises the question of criterion of a successful case—must the patient walk out of hospital?) A prophylactic ligation of the femoral vein was seriously considered in the present case after the second embolism.

Suppurative mediastinitis and pericarditis.—These were overcome by drainage and the exhibition of sulphanilamide in full doses (6 g. daily) for lengthy periods. I have no doubt of the great benefit conferred by the drug. The case illustrates that even in a desperately ill patient hæmolytic streptococcal mediastinitis and pericarditis are not necessarily fatal if free and *early* exit is provided for the pus. The electric suction pump was of great help at this stage in maintaining effective drainage of the mediastinum and keeping the patient dry of the profuse purulent discharge. The seventh-cartilage dependent drainage of the pericardium was also amply justified. The way in which the large purulent cavity behind the sternum eventually became obliterated was striking.

Necrosis of buttocks.—At one stage this seemed to threaten a fatal issue. The patient was very heavy and the damage seems to have been done during the first few hours of unconsciousness when she was completely immobile and was being nursed in an oxygen tent. The difficulty was increased by the fact that change of posture—e.g., on to the side—was intolerable for the patient for some days. In Crafoord's first case there was extensive necrosis of the buttocks, followed by abscesses and erysipelas. The mercury-vapour lamp was used in treatment, but it was some weeks before the patient could tolerate lying on her side for any length of time.

Empyema.—The advantage of Meyer's manœuvre for maintaining an intact pleura could never be better shown. Although a large left hæmothorax formed, and although the mediastinum welled with streptococcal pus, separated only by the filmy, transparent pleura, this was enough to prevent the hæmothorax becoming fatally infected at an early stage. The collection of blood was aspirated several times on account of its size. It was only after four weeks that it became infected, the infection being then probably hæmatogenous as it did not follow aspiration. By that time it was possible to treat it safely by suction drainage followed later by rib resection.

Scalenus anticus syndrome.—This syndrome, which developed after about three months, must be attributed to falling of the shoulders due to the grave and prolonged illness. The diagnosis presented some doubt, but was clinched by the therapeutic response.

SUMMARY

A summary is given of the history of Trendelenburg's operation for pulmonary embolism and a successful case is described; the twelfth in the literature and the first in Britain.

The case showed a number of remarkable post-operative features: (*a*) Pronounced cerebral symptoms—prolonged unconsciousness, clonic convulsions, amaurosis, deafness, psychological changes. (*b*) A second embolism. (*c*) Suppurative mediastinitis and pericarditis, treated by drainage and chemotherapy. (*d*) Hæmorrhagic pleural effusion, later becoming an empyema. (*e*) Massive necrosis of the buttocks. (*f*) Scalenus anticus syndrome. All these conditions were duly overcome.

I should like to thank Dr. Patrick Nagle, the anæsthetist, for his help in resuscitation, and Sister Jessie Peers for her skilful and devoted nursing of the patient.

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Clinical and Laboratory Notes

HERPES FEBRILIS IN LOBAR PNEUMONIA

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ARTICLES and letters in recent issues of THE LANCET have shown interest in herpes febrilis. In a letter in the issue of April 15, Dr. Edwin Goodall asked for clinical observations on the incidence of herpes in pneumonia. The following note on cases seen in a large fever hospital may therefore prove of interest. The statistics are based on 500 consecutive male cases of lobar pneumonia admitted between 1930 and 1936 to Belvidere Fever Hospital in Glasgow. Very full notes were made daily on each case, the occurrence and extent of herpes febrilis being one of the points observed. The impression gained during this period was that herpes was of little significance one way or another, but when the figures were investigated some surprising points emerged. The accompanying table shows

INCIDENCE OF HERPES FEBRILIS IN LOBAR PNEUMONIA

	—	Non-fatal cases	Fatal cases	Total	Case-mortality (per cent.)
Type I	Herpetic ..	48	1	49	2·04
	Non-herpetic ..	81	12	93	12·9
	Total ..	129	13	142	9·15
Type II	Herpetic ..	41	16	57	28·06
	Non-herpetic ..	111	31	142	21·83
	Total ..	152	47	199	23·62
Type III	Herpetic ..	2	2	4	50·0
	Non-herpetic ..	6	4	10	40·0
	Total ..	8	6	14	42·85
Group X	Herpetic ..	40	2	42	4·76
	Non-herpetic ..	90	13	103	12·62
	Total ..	130	15	145	10·35
Total ..	Herpetic ..	131	21	152	13·82
	Non-herpetic ..	288	60	348	17·24
	Total ..	419	81	500	16·2

that in 152 cases, or 30·4 per cent., there was a herpetic eruption during the course of the pneumonia and the case-mortality for this section was 13·82 per cent., whereas for the non-herpetic group the case-mortality was 17·24 per cent. This difference is not great, but it suggests that the presence of herpes makes the prognosis a little more favourable.

The figures for cases caused by the different types of pneumococcus show that of the type I cases 34·5 per cent. had herpes with a case-mortality of 2·04 per

cent., which is much less than the 12·9 per cent. of the non-herpetic section. Of the type II cases 28·64 per cent. had herpes with a case-mortality of 28·06 per cent.—more than twice the rate for the non-herpetic type I group and greater than the 21·83 per cent. of the non-herpetic type II cases. The paucity of type III cases prohibits definite conclusions, but the figures show that of the 4 patients with herpes 2 died. Of the group X cases 28·96 per cent. had herpes, and here the case-mortality of 4·76 per cent. was slight as compared with 12·62 per cent. in the group without herpes.

When the area of skin surface involved was considered, it was found that in 137 cases the herpes appeared on the face (usually round the lips, external nares, and less often on the cheeks and ears) and the case-mortality was 14·5 per cent. In the remaining 15 cases other sites on the body surface were affected, and of these patients only 1 died (6·6 per cent.).

SUMMARY

Herpes febrilis was observed in 30·4 per cent. of a series of 500 male cases of lobar pneumonia. Its incidence was greater in type I cases and approximately equal in the cases caused by the other groups of pneumococci. The case-mortality suggests that the prognosis in type I and group X pneumonia was good but was less favourable in type II and type III cases when herpes febrilis was present.

The work in Belvidere Fever Hospital was carried out with the permission of Dr. Thomas Archibald, medical superintendent. The types of the pneumococci were identified by Dr. Robert Cruickshank, to whom I am greatly indebted.

DERMATITIS AND STOMATITIS IN PNEUMONIA TREATED WITH M. & B. 693

BY ELI DAVIS, M.Sc., M.D. Manc., M.R.C.P.

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AT the Royal Society of Medicine's recent discussion on the treatment of pneumonia (*Lancet* 1939) the rarity of serious complications following the administration of M. & B. 693 was emphasised by Whitby and Gaisford. As severe skin reactions were not mentioned, I made brief reference at that discussion to the following case

A thin female child 16 months old, who had had no previous illness, was admitted to St. Stephen's Hospital on Jan. 9, 1939, with four days' history of cough, fever, and anorexia. She was seen to be ill and febrile, and râles were heard in both lungs. The tonsils were enlarged but only moderately congested. Next day her temperature, pulse-rate and respiration-rate (T.P.R.) reached 104·4° F. and 180 and 66 per minute respectively. She was seriously ill, and clearly suffered from pneumonia. The heart rhythm was tic-tac; there were râles and rhonchi in profusion in both lungs, but râles were most numerous in the right lower lobe. A dose of 0·25 g. M. & B. 693 by mouth was given on Jan. 10 and thereafter 0·125 g. four times a day. The child was nursed in an oxygen tent. She became cyanosed on Jan. 11. High fever and toxæmia continued until Jan. 18 when the temperature did not exceed 99·6°. On Jan. 19 and 20 there was only moderate fever and the child had much improved, though râles persisted in the right lower lobe.

Next day (Jan. 21) the child became very fretful, and the temperature mounted to 101°. On Jan. 23 a diffuse morbilliform rash appeared over the face, limbs and trunk (T. 102°). M. & B. 693 was stopped, but the eruption became more raised and extensive, and on Jan. 27 a vivid scarlatiniform rash became superimposed. This mixed rash persisted, associated with severe toxæmia and high fever. (Jan. 28: T.P.R. 105°, 160, 32.) Although râles were still heard, there were no respiratory symptoms. The leading feature was then the dermatitis which covered the skin in a raised confluent sheet and was resistant to treatment (calamine lotion, Lassar's paste with 3 per cent. tar). On Jan. 31 the T.P.R. was 104·8°, 148, 28. The rash was most intense over the face where large blebs showed, and it had spread to the lips and mouth. There was general facial œdema with gross cheilitis, blepharitis and stomatitis. The most serious feature was the severity of the stomatitis, and feeding the child was very difficult. Sulpharsphenamine (0·15 g.) was injected intramuscularly, and repeated applications of Dettol (1 in 30), acriflavine, and Mandl's paint seemed of no benefit. The patient's condition deteriorated further.

On Feb. 4 Dr. Alan Moncrieff suggested using 1 per cent. gentian-violet. This was applied to the mouth first two-hourly, later four-hourly, and subsequently twice per day. Her mouth improved from the first applications of gentian-violet, and likewise her general condition. On Feb. 6 the T.P.R. was nearly normal, and she steadily improved. The superficial layers of the skin peeled off in sheets from Feb. 14 and the skin became irritable. Nevertheless improvement in skin, mouth and general condition continued. By March 1 the skin was nearly healed, and until then lips and gums had bled very easily. The lungs were free from adventitiæ by Feb. 15. In the latter half of February improvement was checked by the development of right otitis media, and on Feb. 20 right aural discharge began—and continued. Otherwise the child made excellent progress and on March 23 the only abnormalities were moderate roughening of the skin and a diminishing scanty right aural discharge.

The total dose of M. & B. 693 was 6·75 g. in fourteen days.

Additional data.—The rash appeared on the 19th day of the disease, and on the 14th day of the administration of M. & B. 693; 6·75 g. of the drug was given in all. Blood-count, Feb. 3 (stomatitis severe): red cells 5,120,000, Hb. 82 per cent., colour-index 0·8, white cells 16,200 (polymorphs 42·0, eosinophils 6·0, basophils 1·5, lymphocytes 37·5, monocytes 13·0 per cent.). Feb. 23 (right otorrhœa): white cells 23,500 (polymorphs 39·5, eosinophils 9·0, lymphocytes 45·0, monocytes 6·5 per cent.). On Feb. 6 the centrifugalised deposit of urine showed a few blood-cells, epithelial cells and calcium-oxalate crystals. No uroporphyrins were detected spectroscopically. On Feb. 18 a catheter specimen of urine showed no abnormality in film or culture. On Feb. 3 mouth swabs were examined but no spirochætes were found; on the 20th hæmolytic streptococci were cultured from a nose swab; and on the 22nd an aural swab was taken from which no diphtheria bacilli or hæmolytic streptococci were grown.

M. & B. 693 cannot escape responsibility for the dermatitis and stomatitis described above. Similar though much milder skin eruptions have been seen during the administration of M. & B. 693 to pneumonia patients at St. Stephen's Hospital. The rash followed dosage of the drug much lower than that recommended by Evans and Gaisford (1938). Noteworthy features were that the stomatitis though gross was not accompanied by neutropenia; that eosinophilia was present (9 per cent. of 23,500 white cells); and that no uroporphyrins were found spectroscopically (one examination only).

I must thank Sir Frederick Menzies, medical officer of health for the county of London, and Dr.

(*Continued at foot of opposite page*)

MEDICAL SOCIETIES

MEDICO-LEGAL SOCIETY

AT a meeting of this society held on April 27 the chair was taken by Sir TRAVERS HUMPHREYS, the president, and a paper on the

British Workmen's Compensation Acts

was read by Sir AMBROSE WOODALL. In a short historical survey he represented the acts as a stage in the progressive improvement of the lot of the poor. Benefit, however, was limited to 30*s*. a week, which was often less than the public assistance allowance. Many workmen therefore did not apply, preferring sickness benefit or public assistance. The term "compensation" was misleading, for its true meaning was an equivalent to a loss. The injured workman had two immediate problems: to pay his way and to recover earning capacity. Dreading the poor-law, he kept going for a time with borrowed money and his weekly compensation. Unless he was a patient in hospital, he first attended the surgery of his panel doctor, where he received a sedative—usually bromide—and liniment. After about six weeks of this treatment the panel doctor sent him to a hospital, where he would probably undergo a course of massage and radiant heat. Travelling, hospital treatment, certificates, and appliances cost money, and the workman now became worried, but the panel doctor could only strengthen the nerve tonic. The workman would probably then be summoned to Harley Street to be examined by an eminent specialist on behalf of the insurance company. After detailed examination and many unintelligible questions he would probably be told he was fit for light work. He usually agreed, as a weekly wage seemed to offer a way out of his difficulties. A day or two later he received the usual notice reducing his compensation to 15*s*. a week or less, and when he asked his old employer for light work he was told to look elsewhere—another shock to a man whose nerves were already frayed. He sought the aid of his union or of a solicitor and was told to sign on at the labour exchange and seek work from all firms in the district, in which search he would be unsuccessful. Eventually the case came into court, and the workman, handicapped by ignorance of procedure and anatomy, attempted to give evidence. After the judgment he was told how much weekly compensation, if any, he was entitled to, and after a time negotiations were usually commenced for a lump-sum settlement. Some men were so anxious to pay off their creditors that they would take a totally inadequate sum; others, having lost heart, were quite content to drift on with unemployment benefit or poor-law relief in the hope of securing the maximum amount. The full redemption value of a claim was seldom paid. The system of lump-sum redemption explained the popularity of the acts. A lump sum might enable a man to start a small retail business, or, if he were a craftsman, to join the employing class. He could also live comfortably for a time, or, if he could get back to work, make provision for his old age.

Improvement in the acts must take the form of increasing benefits and widening their scope. The ideal arrangement was that the workman should receive more pay than he received in wages. This principle, however, was not likely to be applied immediately, and a reasonable modification of the act would be to pay about two-thirds of the average wage. Many authorities considered that these cases should be taken from the county courts and made part of the social services of the country; this would save an enormous annual expenditure on legal and medical fees. The railway companies now paid to members of the National Union of Railwaymen £281,000 a year, and the number of cases heard every year between the companies and the union did not average more than about fourteen. Not only did the injured railwayman get reasonable treatment, but every endeavour was made to find him suitable work. Litigation was replaced by mutual goodwill. Sir Ambrose admitted that his proposal would probably double the cost of working the acts, but he pressed it as a return for the unnecessary suffering inflicted by society on a deserving and unfortunate class, because it would foster a better spirit in industry, and because the expense was small in comparison with expenditure in other directions.

DISCUSSION

Judge W. B. EARENGEY, K.C., denied that county-court judges had so much sympathy with the poor that they did not do justice to employers. The acts had given the workman a right which he had not enjoyed under the existing law, and it was therefore wrong to say that they had inflicted suffering on him. Once a weekly payment had been made, a lump-sum settlement needed the approval of the judge, who must bear in mind the immediate advantages of a lump sum to the man, and on the other hand the probability of a quick recovery as soon as the troubles of litigation were removed. The disadvantages of such a settlement to the workman had been highly exaggerated.

Mr. J. L. SMYTH, a member of the Trade Union Congress, said that the lenience of the county-court judges to the workman, which induced them to stretch the law in his favour, was the best evidence that the acts needed reform. The right of the workman at common law was practically useless, for if the injury was caused by the carelessness of a fellow-workman the right was barred by the doctrine of "common employment"; and the workman had always to establish personal negligence or breach of statute by the employer.

Dr. KENNETH MCFADYEAN pointed out that unless a workman belonged to a union, there was no provision for training him to a new occupation.

Mr. R. C. ELMSLIE, F.R.C.S., remarked that the lot of the workman was better than that of the professional man, for the doctor or lawyer who suffered injury had to bear his own burden. Moreover, the injured workman might be entitled to 30*s*. a week but the sick workman could only obtain 16*s*. a week under national health insurance. The amount expended in compensation every year was about

(*Continued from previous page*)

D. S. Sandiland, medical superintendent of St. Stephen's Hospital, for permission to publish this case; Dr. Alan Moncrieff for help in the management of the child; Dr. G. W. Goodhart, of the L.C.C. Group Laboratory, for pathological investigations; and the nursing staff concerned for their skill.

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£13,000,000; he asked whether the country was receiving proper value for this expenditure in terms of men returned to work. Most accidents were not the fault of anyone, and to abolish the doctrine of common employment would not assist many workmen. A tribunal similar to the court of referees under the unemployment insurance system would settle the large majority of disputes with ease.

Mr. V. SAMUEL (barrister) spoke of the work of the Bentham committee, which advised, through its "poor man's lawyers," workmen who would otherwise not obtain legal assistance. This committee had suggested compulsory insurance of liability to pay compensation, the extension of common-law rights, and the payment of compensation for all illnesses arising out of the employment.

Mr. W. H. THOMPSON (solicitor) said that the acts had been passed to interpret an obligation owed by society to workmen. Under the industrial transference scheme approved societies, public-assistance committees and other bodies responsible for assisting injured workmen, struggled to push candidates from one to the other. The practical working of the acts presented a much more sombre picture than was drawn on a basis of theory. Insurance companies pocketed 40 per cent. of premiums, and the workman had to pay legal and medical charges. Moreover, he was deprived of his rights in all sorts of unseen administrative ways. A barrier to reform would be found in the large vested interest of the medical profession in the examination of workmen suffering from injury and industrial disease and in the giving of evidence in court.

Sir ARNOLD WILSON, M.P., said his attention had been drawn to the shortcomings of the acts by the hard cases that had constantly been referred to him by general practitioners in his constituency. He thought compensation should be at the rate of two-thirds of the man's wages without an upper limit. This scheme would work well and would only cost 15–25 per cent. more. No country in Europe had so low a scale of compensation in comparison with wages, or failed to make the employer liable for medical treatment, or to make statutory provision for rehabilitation. He leant to a system under which medical referees would examine the patient privately. They would generally reach an agreement, for the truth was much more easily arrived at when a man was treated sympathetically. He would sooner retain the county court than set up a special tribunal; there were not too many judges to make uniformity of treatment possible. Only 2 per cent. of all compensation cases went to the court; 90 per cent. were terminated after less than twenty-six weeks, and very few went to court before the man had been disabled three months. The 2 per cent. represented, therefore, a small number of the more serious cases. Such disputes ought to be settled by litigation. He did not like lump-sum payments, and they were not allowed by the majority of civilised countries. They were bad unless combined with effective rehabilitation. He hoped for a Rehabilitation Act, under which compensation would be continued until recovery. Legal persons interested in the problem should do their best to restore medical men to the position of persons charged with rehabilitation.

Prof. HERMANN LEVY said he was much impressed by the benevolent and charitable spirit which animated judicial decisions on these acts, and by the regret of judges that the law did not go far enough. More medical and industrial assistance should be given to the courts. In Germany the Berufsgenossenschaften (mutual indemnity associations), on which employers and men of the trade concerned were represented, gave the court invaluable advice on the special circumstances of the industry.

TAVISTOCK CLINIC

AMONG the lectures delivered at the clinic this week was one given on May 1 by Dr. EMANUEL MILLER on the relationship between

Neurophysiology and Psychology

He thought there was no need for the dog-fight that so often happened when neurologist and psychologist came together. Both dealt with the same subject in different languages. In relating the two subjects, there were two approaches with different fields of reference. Neurophysiology was concerned with an instrument of behaviour, an instrument that could be described and studied. The nervous system could be assumed to be composed of fundamental units which could be built into a hierarchy of higher structures still subservient to their constituent units. To what extent that law held good through the whole range of behaviour was the burden of the lecture. The neurologist believed that all the intervening elements between receptor and effector were of the same kind. Despite this doctrine, differences in value of responses were seen and required explanation by the neurologist. The reflexology of Becterew and Pavlov had been so modified by further researches as to suggest that the edifice of reflexology had collapsed. The analogy of the telephone exchange, for example, was falsified by an example from electricity: a changing electric sign by which a message moved across a screen was effected by an operator who inserted a a stencil-contact which was seen as light. If the totality of that switchboard were mechanical, so might the nervous system be. But a symbolic event had taken place and the message conveyed to the reader bore no relationship at all to the electrical arcs and circuits. At each end of the machinery was a person who understood the message and belonged to the same symbolic level. The operator might have shouted the message from a balcony but chose instead to use electrical machinery. Take those two cultural persons away and the machine was meaningless. In the same way, a stimulus was received at one end of the nervous system; it was meaningless until the oscillations of the æther impinging on the retina had undergone a synthesis not explicable in neurological terms. The neurologist was apt to confuse a sensation of red with a red sensation. Events in an instrument and events in an organism were different, and events in awareness must be described in the language of awareness.

The method of approach of neurology was different from that of psychology; it claimed to be purely objective while psychology was said to be incapable of objectivity. The psychologist could reply: Why do you call a set of phenomena "subjective"? We regard them as quite as objective as your observations. The neurologist retorted that they are incapable of ordinary measurement and came from inside. Lashley's experiments on rats in mazes indicated that the rate of learning depended on the quantity rather than on the locality of any brain lesion inflicted. The integrity of the visual, olfactory or tactile system was not the essential factor in enabling them to find their way out of a maze. This showed that the rat's brain worked as a whole and the alleged reflex arcs could be switched over to other areas.

Coghill's embryological study of the behaviour of amblystoma showed that there were total forms of integrated muscular pattern even when there was no evidence of any nervous arcs, when muscle had developed but not neural structure. The organism acted massively rather than on a basis of neuromuscular reflex-arc configurations. The latter grew into and implemented the pre-existing pattern. Reflexology was now turned hind-forwards. If simple instinctive responses preceded delicate and complex ones, the instinctive apparatus was much older than the reflex, which was imposed on it. The amblystoma embryo lived through its muscle movements in the absence of a nervous system. Therefore neurology failed to explain entirely the whole reactions of an organism, and there was good reason to criticise reflexology as an explanation of the totality with which psychiatrists were concerned.

Up to the time of Henry Head the study of aphasia had been an anatomical one. More and more of the cortex had been included in the speech area, but Head had found it still insufficient and had been obliged to describe aphasia in terms of grammar rather than of areas. The translation of a symptom into Greek did not explain it. Despite the fact that the lesion might be localised, the whole understanding of a language defect had to be explained in terms of language. The loss of a piece of cortex did not account for or help the loss of a particular piece of language-structure.

When it came to imagery the neurologists used the most extraordinary terms. "Image traces in the cortex" were spoken of, the traces of past events being somehow registered in the cortex. The whole nature of imagery seemed to make the use of such language impossible. Experiments suggested that an image had a specifically organic correlation; for example, after-images on the retina. But certain types of image—especially those seen in certain kinds of children—showed clearly that that chemical interpretation was untenable. Eidetic images could not be explained in this way; they were perceptual in intensity and did not conform to the ordinary laws of memory. Sometimes they had a dynamic quality, and evoked other images immediately afterwards. The image must be regarded as a process and not a structure and the neurologist must explain it as such. It was a transaction in the same way that perception was. The image was made of history and all histories belonged to time. Neurology pre-eminently belonged to space. Every word used in language was not an object but a class. Even "Yes" was a class-name. When it came to the description of events the neurologist must hand over to another discipline.

If the neurologist said that every neurosis had its psychosis or mental event, then there were no forms of behaviour not capable of some neurological description. As the instrument seemed to predetermine the psychological life—knock a man on the head and he became unconscious—the neurologist would say that neurological events preceded psychic events. The reductio ad absurdum of that argument was that it abolished consciousness altogether. All we knew of consciousness was just laryngeal behaviour. That hypothesis could be held, and no conclusions about it on the level of science could be drawn. If there was room for consciousness after all, what did neurology tell us about conation, affectivity and cognition? Had they a local habitation as well as a name? Cognition and recognition lay in integrated cortical activity. There was evidence that the affective life was closely related to the hypothalamic and thalamic apparatus. Having isolated a local structure, however, did not explain affectivity. The various forms of thalamic syndrome showed that affectivity was related to that region of the brain, but the problem of feeling, emotion and instinct went beyond the confines of the central nervous system and arose from every tissue of the body. The solution was not in the dethroning of neurology and enthroning of psychology, but in the assertion of a biological point of view speaking in terms of the organism. Both disciplines must abdicate in favour of a biological attitude. Psychology must give up many of its trimmings and neurology many of its claims. Both were far too narrow. Behaviour was anterior to even an autonomic nervous system, but not to an integrity of the organism as a whole. For the study of behaviour was that of a vital series of which neural events were an essential part but not the whole. It needed a universe of discourse capable of describing its configurations.

MANCHESTER MEDICAL SOCIETY

AT a meeting on April 5 a discussion on the

Treatment of Cancer of the Breast

was opened by Mr. H. H. RAYNER. He recalled a statement made twenty-five years ago by a surgeon that in thirty years' practice he could not remember one patient with breast cancer who had been cured by operation. Possibly that was an unduly pessimistic observation but it did bring home to us that real progress had been made in the treatment of the disease, mainly because of the adoption of the radical operation, for of the patients operated on for cancer of the breast in stage 1 50–80 per cent. now survived for at least ten years. Of all the patients submitted to the radical operation, however, in only about a quarter to a third was the disease in an early stage. Probably the proportion of early cases was much smaller than this twenty years ago; the slowly progressing appreciation amongst women of the significance of a painless lump in the breast and the diminishing dread of surgical operations were factors tending to increase the proportion of early cases. The fact must be faced that in a proportion of cases the disease produced no visible or palpable change in the breast perceptible to an observant woman until it was far advanced—for example, a deep-seated growth in a firm and well-developed breast commonly betrayed no evidence of its presence until there was obvious enlargement of the axillary lymph-glands.

The accepted grouping of cases into three stages according to the extent of the disease should be supplemented by other details, such as the histological type of growth, if it was to allow safe comparison between different methods of treatment. Mr. Gordon-Taylor's recently published results were noteworthy for the efficient way in which the patients were followed up and for their excellence, for of his 113 patients in stage 1, 84 per cent. survived at least ten years. In Mr. Rayner's own series of 128 radical operations, all of which were confirmed histologically, 45 cases were in stage 1; of these, 14 (31 per cent.) were known to have died from cancer within ten years of operation; of the 14 failures 8 were in patients whose original growth was situated at the extreme inner periphery of the breast overlying the sternal edge. Of the 83 stage 2 and 3 patients 62 (or 77 per cent.) had died from cancer within ten years; of the 9 known to have survived for ten

years several had lived for much longer periods and were still apparently cancer-free. Not all the deaths were due to recurrence and hence it was difficult to give results in a simple form.

Dr. RALSTON PATERSON said that although surgery was the dominant method of treatment in carcinoma of the breast, radiation (radium and X ray) also had a very real place. It could be used alone with results not quite as good but certainly comparable stage by stage with surgery alone, where cases were unsuitable for the radical operation. It was the only treatment for late cases, in which it was occasionally curative and consistently palliative. Used in conjunction with surgery it definitely improved the probabilities of permanent cure. Radiation therapy had to be of a radical nature, a considerable reaction of normal tissue being unavoidable. In radium therapy this required an extensive implantation of the whole breast, axilla and supraclavicular zone in continuity. In X-ray therapy a similar zone had to be irradiated to the limits of skin tolerance by means of "tangent" fields.

The combination of methods now adopted at the Radium Institute was: stage 1, short preoperative course followed by immediate radical surgery; stage 2, radical surgery followed by postoperative intensive X-ray therapy to the whole postoperative zone, axilla and neck; stage 3, radiation first (radium or X ray), amputation in the face of failure of resolution; stage 4, radiation only.

A plea was also made for immediate admission to hospital of all early breast carcinomas, and attention was called to the dangers of local excision or local mastectomy except where the surgeon is prepared to proceed at once on naked-eye diagnosis to the radical operation.

REVIEWS AND NOTICES OF BOOKS

Recent Advances in Medicine

Clinical—Laboratory—Therapeutic. (9th ed.) By G. E. BEAUMONT, D.M. Oxfd, F.R.C.P., physician to the Middlesex Hospital; and E. C. DODDS, M.V.O., M.D., D.Sc. Lond., Courtauld professor of biochemistry in the University of London and director of the Courtauld institute of biochemistry at the Middlesex Hospital. London: J. and A. Churchill. 1939. Pp. 431. 15*s*.

THIS pioneer of the Recent Advances series has always been a valuable and popular book, though the clinician may feel that in spite of its comprehensive title laboratory tests and procedures have bulked very large in its pages. The new edition opens with a chapter on the sulphanilamide drugs, giving their names, formulæ, and chemical properties with admirable succinctness and indicating their fields of usefulness so far as these had been demarcated in the earlier reports on them.

Vitamins A to E plus K occupy chapter II. Ketogenic diets disappear from the treatment of urinary infections, but mandelic acid remains. The dietetic treatment of diabetes has been largely rewritten, with the incorporation of the new food analyses of McCance, Widdowson and Shackleton. Preliminary starvation, followed by a rather elaborate series of graduated diets, is recommended; in the largest of these the carbohydrate allowance is only 135 grammes, and in all of them the daily allowances in grammes of carbohydrate, protein, and fat are calculated to one or even two places of decimals! Surely the laboratory worker does not credit the clinician with that degree of accuracy; one might as well recommend the counting of every pulse with the electrocardiograph. We would question the statement that "with protamine zinc insulin the blood-sugar begins to fall in nine to eleven hours"; there is evidence that protamine zinc insulin exerts a considerable action much sooner after injection than that, and many physicians therefore prefer to give it in the morning rather than, as here recommended, in the evening. In the account of diabetic coma, the importance of dehydration in the pathogenesis and the clinical picture of the condition scarcely emerges, and in its treatment drugs of such doubtful value as strychnine and Coramine are given a place. A description of gastroscopy is introduced. The preface states that the account of the medical and surgical treatment of gastric and duodenal ulcers has been largely modified in accordance with present knowledge. The reader may therefore be disappointed not to find an adequate discussion of the rôle of surgery in treating chronic uncomplicated ulcer, or of the types of gastric operation now practised and the risks they involve—matters of great moment to the physician in charge of a difficult case.

Dr. Bedford has supplied a new series of electrocardiograms, and the value of chest leads in the diagnosis of coronary disease is emphasised. Treatment in cardiac disease is well summarised; digitalis is given by the ultra-precise American method of calculating the dose in relation to the body-weight. There is an excellent chapter on the sex hormones. A number of new laboratory procedures have been introduced, the old chapter on tests of pancreatic function has been omitted, and there are many minor alterations.

The book has neither increased in size nor diminished in usefulness; such critical notes as we have made should be construed as a tribute to its general excellence.

Analysis of Parergasia

By GLADYS C. TERRY, formerly research assistant in psychiatry, Phipps psychiatric clinic, Johns Hopkins University; and THOMAS A. C. RENNIE, M.D., associate in psychiatry in the clinic. New York: Nervous and Mental Disease Publishing Co. 1938. Pp. 202. $4.

INTEREST in schizophrenia is at present predominantly therapeutic, and is sometimes accompanied by indifference to clinical study and to any forms of treatment other than those making use of insulin and Cardiazol. This interesting book is a timely exposition of how much can be learnt and done by solid psychiatric methods. Prof. Adolf Meyer of Baltimore has for more than a quarter of a century been urging a psychobiological conception of schizophrenia (which he prefers to call parergasia) and has insisted on his pupils putting it to practical account in treatment. The study of 77 cases here presented by two of the workers in his clinic indicates the value and the limits of the method employed. The case-histories were for the purposes of the inquiry carefully coded and charted, and the reaction patterns divided into six groups, in which aggression, conversion, passivity, deliroid features, affective disturbance, and defeatism were prominent. Nearly half the cases had at the time the monograph was written (mostly four or five years after treatment) recovered to the point of being able to live outside hospital; details

are given as to the nature of this recovery and the condition of the other patients who are now living and in need of institutional care. It is concluded that there is no significant relationship between outcome and clinical reaction type, and that the factors prognostically favourable are: sympathetic environment to which patients can return; interests, goals and pursuits in keeping with their ability; onset of the psychosis in a setting of unusual strain that can be modified; intact rapport; and both will and ability to coöperate in treatment. In the psychosis itself hopeful features are intact thinking and personal appearance, absence of hallucinations, affective admixture, and the presence of a temporary infection. None of the cases in the series was treated with insulin or cardiazol. This is a careful and admirably sensible clinical study in a complicated field.

Aids to Public Health

(4th ed.) By LLYWELYN ROBERTS, M.D. (in hygiene), D.P.H., deputy medical officer of health, borough of Ealing. London: Baillière, Tindall and Cox. 1938. Pp. 263. 4*s*.

THIS little book now appears in entirely new guise. Good as was its predecessor (by Dr. W. G. Aitchison Robertson), the new edition has lost nothing in the rewriting, and cannot fail to be of value to the student who is preparing for his finals. The subject matter is excellent and right up to date. In one small respect it might have been improved—by giving references in footnotes to the statutes, orders or regulations upon which local authorities might base their actions. For example, we read that "Persons in infected households must notify the local authority if they possess any books from a public library"; a footnote indicating Public Health Act, 1936, S.155 (3) would be useful both to familiarise the student-reader with the details of sanitary law and to remind him later, when he has become an administrator and still keeps the "Aids" on his shelves, of the proper course of action. The book includes a useful innovation in a chapter setting out the framework of central and local government administration and the openings which are offered to medical students who wish to enter the public-health service.

Über die Liebe

By Dr. med. H. VON HATTINGBERG. Munich: J. F. Lehmann. 1938. Pp. 362. RM.5.

IN twenty-five years of practical experience as a psychotherapist, Dr. H. von Hattingberg has found in all the patients who have sought his help a disturbance of the capacity to love. Too many persons today, he says, are misguided by false notions of love, a condition which cannot be remedied by anxiously preventing these notions from interfering with their emotional life. In this book he tries to explain perversions and inhibitions by revealing the motives behind them and thus to suggest to sufferers a way out of unnecessary misery. He has treated his material in a popular form and, though he sometimes expresses known facts in a novel way, he does not set out to establish any new concept. The main section of the book deals with what he calls "sham" love, such as masturbation, perversions, mechanical sexuality, homosexuality and jealousy, and inhibitions of love such as impotence, frigidity, matrimonial conflicts and "coupled neurosis." This section is intended to help "love-sick" neurotics by giving them an insight into their problems. To the medical and psychotherapeutic reader the first and third sections will be of greater interest, since they are concerned with an attempt to incorporate the ideas current in modern Germany into a scheme of psychology, which was developed on theories now repudiated there. The author tries to prove (in six pages) that Freud's approach is wrong, though his own psychotherapeutic practice has clearly been based on it. His criticism of the various schools of psychology, his attitude towards love and sex in pre-Hitler Germany, and his exposition of the attitude of the Third Reich towards love, evoke the picture of a psychologist who is groping for a firm foothold but whose mental outlook wavers between the irreconcilable convictions of two generations.

Doctors in Shirt Sleeves

Edited by Sir HENRY BASHFORD, F.R.C.P. London: Kegan Paul, Trench, Trübner and Co. 1939. Pp. 294. 10*s*. 6*d*.

Sir Henry Bashford says he has found it a pleasant, though not an easy, task to select extracts from the "happy-go-lucky" contributions to the Grains and Scruples which appeared in THE LANCET between July, 1936, and December, 1938. He has quoted from only twenty—that is, from less than a sixth of the articles published during the period—choosing those which in his view are likely to make most appeal to the general public. These, in the words of the subtitle, are the "musings on hobbies, meals, patients, sport and philosophy" of a mixed bag of doctors of different occupations, generations and experience. Generally one, sometimes two or three, of the lighter dishes are chosen from the varied menu originally supplied by the author, and the fare is no less palatable à la carte than when it formed part of a full-course meal. The arrangement is as apt as the selection. The opening chapter comments on modern youth, as exemplified in the medical student; the closing chapter reflects on retirement—with a garden. In between, three practitioners—from the west country, from the back streets of a midland town, from a London suburb—show (as one of them puts it) that medicine is an extremely individual matter. A surgeon praises the life of a surgeon as the best job in the world; a physician is less enthusiastic about his own work. There are five philosophers, of whom one pours scorn on false biological analogies and inexact reasoning, another defends spiritual values against a materialistic philosophy, and a third, using a sick child's toys as a peg, shows at any rate that man tends to imbue the materials that surround him with spiritual meaning; the fourth gives reason for his conclusion that medicine as such has no philosophy, and the fifth analyses war as a social disease. A biologist analyses medical students (and finds none wholly foolish) and elaborates the thesis that man is the greatest undeveloped baby among the mammals. One essayist recalls his hobbies, two others memories of a public school and of work and play in India. Another passes easily from consideration of an old diary to the duties and interruptions in the day's work of a non-clinical professor. Three of the essays recall the vivid personality of writers no longer with us—Sir Squire Sprigge, Prof. A. E. Boycott, and Prof. C. C. Okell. Some of the omissions will be regretted and it is a pity that Sir Henry's modesty should have deprived readers of his own contributions. Enough is retained to make a book of substantial size and attractive appearance which will certainly create a happy hour or two for lay as well as medical readers.

British Journal of Surgery

THE April issue (vol. 26, no. 104) contains the following articles :—

TUBERCULOSIS OF THE SPLEEN WITH TUBERCULOUS SUBPHRENIC ABSCESS. By W. G. Gill and W. N. Mann (London). The case seems to be unique in the literature. Shoulder-tip pain with unexplained pyrexia suggested subphrenic suppuration ; the pus removed was sterile. The whole spleen was occupied by a single abscess.

ADOLESCENT DEFORMITIES OF THE ACETABULUM. By John Gilmour (Newcastle-on-Tyne). An investigation into the nature of protrusio acetabuli. Primary protrusions are regarded as arising from distortion of the growth focus, due to an acceleration in the rate, and an advancement in the timing, of primary epiphyseal ossification. Treatment is discussed.

THE RELATIONSHIP OF ACETABULAR DEFORMITY TO SPONTANEOUS OSTEO-ARTHRITIS OF THE HIP-JOINT : an investigation of the intra-articular factors which predispose to osteo-arthritic degeneration. By John Gilmour. Increase in the depth of the acetabulum is said to impair the fluid mechanism and increase the susceptibility of the joint to trauma and infection.

OSTEITIS FIBROSA DISSEMINATA. By Mark Coleman (London). Report of a case admitted to hospital with a history of recurrent fractures due to trivial injury. The association with pigmentation of the skin and precocious puberty in females is discussed.

COMPLETE THYROGLOSSAL FISTULA. By Victor J. Kinsella (Sydney). Cure has been effected in one case by ligation of the tract and careful closure of the skin. There are two types, the tubular and the racemose. The anatomical relations are discussed.

THE CLOSED OPERATION FOR INTRACAPSULAR FRACTURE OF THE NECK OF THE FEMUR : final results in recent and old cases. By Thomas King (Melbourne). The results are described in 50 cases of recent fractures and in 30 cases operated on three weeks to three months after the fracture. The author reports success from an operation which combines the use of a nail and a fibular bone peg.

THE PROBLEM OF "BLACK OUT" IN AVIATION (AMAUROSIS FUGAX). By Wing-Commander P. C. Livingston. The author's personal experience is described. The cause of the condition is gravity, brought into action, in this case, by a violent turn in the air, roughly at right angles to the initial course. Postural and mechanical methods of combating "black out" are briefly discussed.

CARCINOMA OF THE LOWER END OF THE COMMON BILE-DUCT. By John C. Dick (Glasgow). The macroscopic and microscopic examination of 13 cases which came to autopsy suggests that the condition is of slow growth and of very low-grade malignancy, and that cure by operation should be feasible.

OPERATIVE TREATMENT OF STENOSIS OF THE VESICAL NECK. By W. K. Irwin (London). A transvesical operation is described in which the author's clamp incisor is used. This has given uniformly good results in 48 cases.

OBSERVATION ON SIMPLE AND MALIGNANT PATHOLOGICAL CONDITIONS OF THE BREAST. By Thirza Redman and J. T. Hewtson (Birmingham). The 205 cases diagnosed as simple have not developed malignant changes during a period of 3–8 years. Operation for cancer in the early stages has given a survival-rate of 67·9 per cent.

MASSIVE NECROSIS OF THE MUSCLES OF THE LEG AFTER OPERATION FOR REMOVAL OF A BONE-GRAFT FROM THE TIBIA. By N. Ross Smith (Bournemouth). The graft was taken from the tibia with the knee acutely flexed. All the muscles of the leg completely necrosed, and the limb, amputated 18 months after the original operation, showed the muscles replaced by fat. The ætiology is discussed.

DETACHMENT OF THE MEDIAL EPICONDYLE OF THE HUMERUS WITH DISPLACEMENT INTO THE ELBOW-JOINT. By E. J. Radley Smith (London). Case-reports are given of 32 cases. Abduction force is the cause, and in nearly half the cases there was proof of a dislocation. The diagnosis is radiological ; and ulnar-nerve injury is a common complication.

CONGENITAL DISLOCATION OF THE HIP. By Bryan McFarland (Liverpool). A method of treatment by traction in the extended position has been successfully used in 18 cases, most often in combination with an operation to form an acetabular shelf. Many advantages over the usual abducted position were found.

CHRONIC NON-TUBERCULOUS DISEASE OF THE EPIDIDYMIS. By Donald McGavin (London). The condition is described as being quite common. The clinical histories and operative findings are given in 7 cases, the causes being classified as inflammatory, obstructive and vascular.

THE PITUITARY ADENOMATA : a follow-up study of the surgical results in 338 cases. By W. R. Henderson (Leeds). The paper is concerned with the after-histories of sufferers from tumours of the pituitary in Dr. Harvey Cushing's series of 338 cases. Pathology and operative technique are briefly described, and there is a very full analysis of the early and of the late results of operation.

SURGERY OF THE ADRENAL CORTEX. By L. R. Broster (London). A critical review of the development of medical knowledge of the relationship of adrenal disease to sexual abnormalities ; and of the biological tests and the isolation of male hormone ; together with a discussion of the results of operative treatment.

There is also a tribute to Dr. Harvey Cushing on the occasion of his seventieth birthday ; and an appreciation of the late Mr. Graham Simpson. Notes on several rare and obscure cases are appended.

NEW INVENTIONS

FORCEPS FOR INSERTING RADIUM INTO THE CERVIX

THE insertion of a radium applicator into the cervix uteri is usually simple, and is carried out by means of the instruments normally found in a well-equipped operating-theatre. None of these is, however, really suitable for this procedure : some are clumsy and obstruct the view, and most do not grasp the applicator satisfactorily, so that when even the slight amount of pressure necessary for the insertion is applied the applicator tends to tilt, necessitating manual replacement and unnecessary exposure to radium.

These considerations led to the development, in collaboration with Prof. James Hendry, gynæcologist to the Glasgow Royal Infirmary, of the forceps shown in the figure. The forceps hold almost any radium applicator in common use, without unnecessary pressure on the radium container and at a convenient angle, and permit a clear view of the field. They are especially helpful when used with a form of gum-elastic tube for holding the radium. This tube can be bent and will retain the bend for an appreciable time, facilitating introduction into cervices that are difficult to enter or abnormally placed.

The forceps were made for me by Messrs. C. F. Thackray of Leeds, who also supplied the gum-elastic tubes that are specially designed for radium use.

ROBERT R. MORRISON, M.B. Glasg., D.M.R.E.
Radium therapist to Glasgow Royal Infirmary.

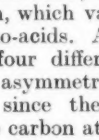
THE LANCET

LONDON: SATURDAY, MAY 6, 1939

BIOCHEMISTRY OF MALIGNANT GROWTH

MANY attempts have been made to discover a chemical or physicochemical basis for cancer. An account of such investigations would fill a bulky volume, but none of them has established any significant differences between the normal and the malignant cell, either as regards its chemical composition or its physicochemical condition. On the contrary, the results of these numerous investigations have seemed to lead to the surprising conclusion that, in spite of the difference in the biological behaviour of these two types of cells, there is a close resemblance in their chemical make-up. An important advance was made by WARBURG'S observation that the cancer cell, unlike most normal cells, can live and carry out its metabolic functions in the absence of oxygen, resembling in that respect a more primitive type of cell, such as yeast. But this property is not strictly confined to malignant cells; it is shared by some other types, both normal and pathological, belonging to the higher animals, and while it accounts for the greater independence of the malignant cell and its ability to grow through tissue spaces, where the oxygen tension is low, it gives no ready explanation for the power of growth possessed by malignant tumours.

A paper by Prof. FRITZ KÖGL,[1] the noted biochemist of Utrecht University, promises to open up a fresh approach to cancer on chemical lines, for he is able to announce new discoveries about the amino-acids which result when the proteins of malignant tumours are hydrolysed by boiling with acid. Amino-acids are the relatively simple chemical units of which the complex protein molecule is built up, and the many which have been isolated all have a fundamental similarity of structure. They consist of chains of carbon atoms of varying length, and the penultimate carbon atom of such a chain always carries the acid group COOH and the basic amino group NH_2. A third valency of this penultimate carbon atom carries a hydrogen atom and with the fourth valency it is tied to the rest of the carbon chain. Diagramatically this arrangement is represented by the formula given below, where R is the carbon chain, which varies for the different amino-acids. A carbon atom carrying four different groups is called an asymmetrical carbon atom, and since these four groups are arranged round the carbon atom in space, and not (as on paper) in a plane, two possible arrangements in space are possible, which have the same relation to each other as any object has to its mirror image or as the right hand to the left. Any substance having such an asymmetrical carbon atom exists therefore in two forms (stereo-isomerides), having exactly the same chemical composition but differing from each other in the spatial arrangement of the four groups attached to the asymmetrical carbon atom, and a third (racemic) form in which the two stereo-isomerides are present in equal proportions. The presence of an asymmetrical carbon atom in a compound manifests itself physically by the ability of a solution of the compound to rotate the plane of polarised light, and two stereo-isomerides rotate polarised light to the same extent but in an opposite direction. In the racemic form, which contains the two stereo-isomerides in equal proportions, the effects on the plane of polarised light balance each other; so the racemic form is optically inactive.



The biological significance of these chemical facts is that when the normal living cell builds up organic compounds containing asymmetrical carbon atoms, it always forms one of the two optically active stereo-isomerides, whereas synthesis in the laboratory always leads to the optically inactive racemic form. Moreover, the ferments present in the body can split only one of the two stereo-isomerides—namely, the one formed in the body—and cannot attack the other stereo-isomeride. Thus the amino-acids found after hydrolysis of proteins of normal tissues are all optically active and represent one of the two possible stereo-isomerides of each acid. But when KÖGL and ERXLEBEN examined the mixture of amino-acids obtained by hydrolysing the proteins of malignant growths they found that while some of the amino-acids were represented entirely in the form of the normal stereo-isomerides—present in the proteins of normal cells—a few were present also partly in the form of the other, optically antagonistic, stereo-isomeride. The amounts of the optical antagonist that were present varied considerably for the different amino-acids. For some of these acids the figures are too small to be convincing, but for such amino-acids as leucine, lysine, and valine, and particularly for glutamic acid, the amounts of the abnormal optically antagonistic stereo-isomeride were so considerable as to leave no doubt that the abnormal stereo-isomerides had entered into the structure of the proteins of malignant cells. The most striking results were always found for glutamic acid, which was represented by its abnormal stereo-isomeride in amounts varying in different tumours from 15 to 42 per cent. of the normal stereo-isomeride.

Glutamic acid plays an exceptionally important part in the intermediate metabolism of proteins, and quite recently it has been shown by FILDES and his collaborators[2] that glutamine, a substance closely related to it, is an "essential growth substance" for most strains of streptococci. It has also to be noted that the presence of a few abnormal stereo-isomerides in the chain

1. Kögl, F., and Erxleben, H., *Hoppe-Seyl. Z.* 1939, **258**, 57.

2. McIlwain, H., Fildes, P., Gladstone, G. P., and Knight, B. C. J. G., *Biochem. J.* February, 1939, p. 223.

of amino-acids, which go to the building up of a protein molecule, will make these chains more resistant to the action of the normal ferments which regulate the building-up and the breaking-down of the cellular proteins. The proteins of the cytoplasm of the cell are not static; they are always undergoing synthesis and disintegration. It is to be expected, therefore, that the presence of a few abnormal stereo-isomerides will interfere profoundly with the normal processes of cellular metabolism. It seems that one must postulate for the cancer cell an alteration of the normal ferment system in the sense that this system has lost its selective power to synthesise protein from only one stereo-isomeric group of amino-acids. Autonomous growth—which means essentially the autonomous synthesis of protein—is the criterion of malignancy, and it is not difficult to correlate this property with the loss of selectivity on the part of the ferment system which regulates the protein metabolism of the cell. One must bear in mind, however, that the presence of abnormal metabolites in malignant new growths may be the result, rather than the cause, of their irregular growth, and may owe its origin to such factors as inadequate vascularisation, processes of cellular degeneration, infection, or interference with the vital processes of the organ by the growth which has arisen in it. The neoplasms analysed so far by KÖGL and ERXLEBEN have been transplantable tumours of the mouse (Ehrlich's adeno-carcinoma) and of the rabbit (Brown-Pearce carcinoma) and human carcinomata of the mamma and of the ovary. These studies require, therefore, to be extended to as many different types of malignant tumours as possible, including the filtrable fowl sarcomata, and also to types of pathological overgrowth other than malignant tumours, such as granulomata, benign tumours, infective papillomata and the various non-malignant cellular hyperplasias due to viruses. Some of these investigations have already been begun at Utrecht. If the presence of abnormal stereo-isomerides of amino-acids proves to be a specific and regular concomitant of malignant growth, an important advance will have been made in our understanding of the biochemistry of cancer. It is also likely to provide information on the mode of action of the viruses capable of transforming normal cells into malignant cells.

HÆMORRHAGE IN JAUNDICE

FACED with a case of jaundice, whether obstructive or hepatogenous, even the most courageous surgeon may fear to operate. The tendency of these patients to bleed has long been recognised, and none of the various explanations of it has produced an effective remedy or even a means of predicting abnormal hæmorrhage. During the past few years, however, the mystery surrounding this subject has become less profound. The first relevant observation was that of L. M. RODERICK, who showed in 1929 that in the hepatic necrosis of sweet-clover disease in cattle there is a hæmorrhagic state and a deficiency in plasma prothrombin. In 1935 a similar deficiency was demonstrated by QUICK and others [1] in the plasma of jaundiced patients and in the same year DAM [2] of Copenhagen found that young chicks fed on a diet adequate except for certain fat-soluble substances developed a fatal hæmorrhagic disease with erosions of the gizzard. This disease was associated with a fall in the plasma prothrombin and could be prevented by feeding the chicks with alfalfa or the non-saponifiable non-sterol fraction of hog's liver fat. For the factor protecting against this hæmorrhagic tendency DAM suggested the name vitamin K (Koagulations-Vitamin), and since that time it has been shown to have a wide distribution. It is found in kale, spinach, carrot tops and tomatoes, as well as some vegetable oils; more remarkable, it develops, apparently by bacterial synthesis, in putrefying fish meal and casein; it occurs in numerous micro-organisms such as *Bacterium coli*; and it may apparently be formed by bacterial activity in the alimentary tract, for it is recoverable from human fæces even in jaundiced patients. Exact information about its chemical nature is lacking although highly potent extracts have been made. KLOSE, ALMQUIST and MECCHI [3] think it is probably a complex unsaturated hydrocarbon.

The clinical applications of this knowledge derive from QUICK's observation [1] that the prothrombin coagulation-time of jaundiced patients is increased; SMITH and his associates [4] have confirmed the presence of this deficiency by a different method, both clinically and under a variety of experimental conditions. The lack of prothrombin seems to be a consequence of the lack of vitamin K and may be caused by defective absorption from an intestine in which there is no bile or by inability of a damaged liver to synthesise prothrombin from the vitamin. Numerous observations have now been published which support these suggestions and show Quick's prothrombin coagulation-time to be a valuable indication of the tendency to bleed; if the "prothrombin time" is increased to more than twice the normal value hæmorrhage is likely to take place. The clinical reports go further, however, and show that administration of vitamin K and bile salts by mouth will often reduce the prothrombin time to normal and banish the danger of hæmorrhage. On another page of our present issue Mr. ILLINGWORTH records his experience with 20 cases of jaundice. He estimates that hæmorrhage is responsible for about 12 per cent. of postoperative deaths in such cases and finds the prothrombin time a valuable means of assessing the risk of this complication. He believes that this risk can be greatly diminished, for the prothrombin time was lowered by administration of a preparation containing vitamin K; but he is apparently not sure that the active factor is the vitamin itself. BUTT, SNELL and OSTERBERG [5] attach more

1. Quick, A. J., Stanley-Brown, W., and Bancroft, F. W., *Amer. J. med. Sci.* 1935, **190**, 501.
2. Dam, H., *Biochem. J.* 1935, **29**, 1273.
3. Klose, A. A., Almquist, H. J., and Mecchi, E., *J. biol. Chem.* 1938, **125**, 681.
4. Warner, E. D., Brinkhous, K. M., and Smith, H. P., *Amer. J. Physiol.* 1936, **114**, 667; *Amer. J. med. Sci.* 1938, **196**, 50.
5. Butt, H. R., Snell, A. M., and Osterberg, A. E., *Proc. Mayo Clin.* 1938, **13**, 753.

importance than ILLINGWORTH to the simultaneous administration of bile salts; but even with a normal diet, which is rich in vitamin K, they have sometimes found supplementary doses of alfalfa concentrate necessary to lower the prothrombin time to normal. STEWART'S observations [6] agree with those of other observers, but he has shown that blood-transfusion is an ineffectual means of lowering the prothrombin time and diminishing the bleeding tendency.

The dosage recommended by various workers differs. BUTT and his colleagues use 400–1200 mg. of their alfalfa concentrate daily with 1–2 g. of bile salts as a prophylactic. No concentrate appears to be available yet in a commercial form, but it is to be hoped that these observations will encourage manufacturing chemists to market one.

THE MICROGLIA

MANY people, even among pathologists, still regard the minute histology of the brain as too intricate a subject for any but specialists, and any discussion that involves the mention of astrocytes, oligodendroglia and microglia is apt to be received by them with a polite indifference bordering at times on incredulity. This unfortunate attitude has doubtless arisen largely because our more detailed knowledge of these cells is almost entirely derived from the work of the Madrid school during the past twenty years, the relevant papers being published in Spanish journals little known in this country. Moreover the methods of demonstrating the minute structure of the brain need scrupulous care in their application.

The magnificent work of CAJAL, the founder of the Madrid school, began to make its mark on the rest of the world fifty years ago and was advantageously presented in the French translation of his treatise on the histology of the nervous system (1909–11). To HORTEGA, now working at Oxford, we owe the separation, in 1919 and later, of CAJAL'S third element into oligodendroglia and microglia. This is of special interest to us because it was FORD ROBERTSON, of Edinburgh, who first clearly demonstrated these cells by his platinum method at the beginning of this century in a work that is too little remembered. ROBERTSON failed however to distinguish between microglia and oligodendroglia, these being collectively named "mesoglia" until analysed by HORTEGA. A great service has been done by WILDER PENFIELD in making the English-speaking people more familiar with the recent Spanish work, but it is even better that we are able to publish on p. 1023 of this issue a lecture given in this country by HORTEGA himself. In this he reviews his work and teaching concerning the microglia. He is responsible for the view, for which there is overwhelming support, that these cells are of mesodermal origin and migrate into the central nervous system during its development from the pia and its invaginations, such as the velum interpositum. In the process the cell becomes altered from its primitive amœboid state to assume an increasingly complicated form until, in its resting phase, it looks remarkably like a twig of gorse. This elaboration of structure is a reversible process, and when stimulated by neighbouring inflammatory or degenerative processes the cell again becomes amœboid and migrates to the pathological focus to exercise its normal scavenging functions. Thus the microglial cell should properly be regarded as the neurological member of the reticulo-endothelial system, and this view has gained wide though not yet universal acceptance.

The latest confirmation of HORTEGA'S conception comes from KERSHMAN,[1] a pupil of PENFIELD'S at Montreal, who in a masterly study of the first comprehensive series of human embryonic and fœtal material to be so investigated has mapped out the various sites at which the microglial cells make their entry into the nervous system. He shows that the process has already begun by the eighth week of intra-uterine life and he concludes, from an examination of the collection at the Carnegie Institute of Embryology, Baltimore, that migration begins with the vascularisation of the brain. Making due allowance for the highly specialised functions of the central nervous system and for its peculiar physical and chemical characters, there is much to be said for studying it histologically along the same lines as other organs.

STUDENTS AND MILITARY SERVICE

LAST week the House of Commons approved by 376 votes to 145 the Government's proposal to introduce a system of compulsory military training, and on p. 1079 are set out the chief provisions of the Military Training Bill as they will affect the student at universities and training colleges. The Minister of Labour may for good cause permit the anticipation or the postponement of the liability to be called up in a particular case, but at the time of writing no sign has been given that third-year students as a group are to be allowed to take their degree (or the 2nd M.B. examination) before they enter military training. The choice of the age-group 20–21 will cut into the careers of students so as to prejudice their future prospects more severely perhaps than those of any other men. Even the anticipation of disruption of studies, apart from the actual period of military training, is likely to disorganise academic life. While it is agreed that all sections of the community must share equally in providing trained men, the nation will gain if the sequence of calling up can be so arranged as to enable students near the end of their course to complete it. As for medical students already embarked on clinical training, we do not see how their course can justifiably be interrupted at all in the name of national necessity. It is already and rightly recognised that in time of war the student who has passed his anatomy and physiology would have to be kept on medical work because it would be of national importance that he should qualify. If, as Mr. Chamberlain says, we are forced to take special measures because we are no longer living in time of peace, it seems unreasonable to meet the present emergency by *removing* medical students from their work and delaying their qualification by at least six months.

6. Stewart, J. D., *Ann. Surg.* April, 1939, p. 588.

1. Kershman, J., *Arch. Neurol. Psychiat.* January, 1939, p. 24.

ANNOTATIONS

SWIMMING AND OTITIS MEDIA

OPENING a discussion arranged by the Medical Officers of Schools Association on April 14, Mr. T. B. Layton (who is an ex-president of the United Hospitals Swimming Club) dealt with the vexed question of swimming for patients with otitis media. He pointed out that a clean bathing-suit contained 500, and a bathing-suit in use 150,000, bacteria per square inch, and that most of these organisms came from the skin, fæces, and saliva of the wearer and were usually considered as non-pathogenic, such as *B. subtilis*, *B. prodigiosus*, and *B. fluorescens liquefaciens*. River and sea waters cleansed themselves by virtue of their high content of oxygen produced by weeds. Even ponds in the centre of large towns did this with complete efficiency. It was only when the temperature of the water exceeded 70° F. that the percentage of oxygen diminished and trouble might arise. A great "bathing-load" might also impair the efficiency of the natural process of cleansing, which otherwise only failed in rivers running through mighty cities. The self-cleaning power of the open sea was shown by the fact that at Whitstable both inshore and in mid-channel *Bact. coli* was absent in samples of 100 c.cm. of water, although near a watch-boat two miles out at sea it was present in samples of 50 c.cm.

Turning to the question of the infecting organisms in disease of the mastoid antrum, Mr. Layton said that for the last ten years he had made a practice of dropping into a tube of broth a piece of bone from every mastoid opened by him. In acute disease the organism found was nearly always the hæmolytic streptococcus, whatever the clinical picture. Occasionally the pneumococcus was found, and, more rarely, Friedländer's bacillus, *Bact. coli*, and the *Vibrio septicus*. One could therefore conclude that the hæmolytic streptococcus and the pneumococcus were the organisms concerned. So far he knew of no record of the pneumococcus, and of only one record of the hæmolytic streptococcus, having been found in waters used for bathing. On the other hand he had found no evidence of infection of the middle ear by such organisms as polluted swimming-pools. Even bathing in the lower reaches of the Thames during very hot weather—i.e., under the worst possible conditions—according to thirty-nine years' experience at Guy's Hospital among patients from the south bank, had not been associated with otitis media. In the few cases in which *Bact. coli* or the *Vibrio septicus* had been found there had been no suggestion that swimming had led to infection. The organisms causing middle-ear disease did not live long in water, and those that polluted water were not responsible for such infection.

Many cases, however, had been attributed, by many doctors in different types of practice, to swimming and bathing. Some of these might be caused by the pushing up of water, and with it pathogenic organisms present in the nasopharynx, into the eustachian tubes owing to inefficient respiration during swimming. Further, a doctor, asked by a parent about the desirability of a child's bathing, might be tempted to play for safety by forbidding it. He might just as reasonably forbid skating for fear that the performer might fall and injure himself. Again, false reasoning might suggest that every case of otitis media in visitors to a watering-place was due to the bathing, although bacteriologically this was impossible. Moreover, the peak of incidence of otitis media in schools was in the Lent term before the bathing-season opened. Towels were a more likely source than water, but Mr. Layton doubted whether even towels had anything to do with otitis media. It was more probable that the overloading of dressing-accommodation, by increasing droplet infection, was responsible.

Usually the hæmolytic streptococcus disappeared from the middle ear by the eighth week after perforation of the drum, and the bacteriology of the chronic ear was the same as that of the skin and of polluted water. Three clinical stages had to be considered. First came the ear that was on the border of becoming chronic (sixth to tenth week after perforation). The organisms of the skin needed moisture in which to grow, and, if the meatus were wetted, there was a greater risk of infection of the ear from the skin. For fear that water might enter the ear, Mr. Layton would not allow a patient to bathe at this stage. The second stage was that of active chronic otitis media. He could see no reason for stopping such a patient from bathing for fear of polluting the water, for the organisms were the same as those already contaminating the water. If the purification, natural or artificial, of the water were efficient, they could do no harm. If it were not, the additional amount of pollution was infinitesimal compared with that caused by the skins, secretions, and excretions of other bathers. Bathing did not harm such patients; indeed, swimming helped them. The third stage was that of the healed disease with persistent perforation of the drum. The alleged harm done to these patients by bathing (which he did not admit) was infinitesimal compared with the mental damage inflicted by the prohibition of bathing, thus making a distinction between the patient and other children.

CARDIOVASCULAR CHANGES IN MYXŒDEMA

THE discovery that the heart sometimes shows gross changes in myxœdema is comparatively new, but in the last few years knowledge of the cardiovascular effects of thyroid deficiency has extended considerably, chiefly because radiography has become a routine and because there have been opportunities for studying the myxœdema produced by total thyroidectomy. Although congestive heart-failure has in the past been reported frequently in association with myxœdema and has been found to react favourably to thyroid extract, more recent observations suggest that in uncomplicated myxœdema gross heart-failure is unusual. This fits in with the observation that therapeutic myxœdema tends to lessen the symptoms of cardiac failure in organic heart disease, and that failure is sometimes precipitated in spontaneous myxœdema by thyroid extract. In a clinical study Savy, Froment, and Jeune [1] note a remarkable absence of cardiac symptoms, even when the heart is considerably enlarged. Anæmia and increase in weight are usually sufficient to account for the effort dyspnœa that may be present. With an impalpable apex-beat, absence of murmurs, and a slow regular rhythm, there is little to call attention to the heart clinically, but on radiography, which is indispensable in this condition, gross changes may be discovered. The most characteristic of them is a general increase in the heart shadow, and this with the feeble con-

1. Savy, P., Froment, R., and Jeune, M., *Ann. Méd.* February, 1939, p. 81.

tractions simulates the appearance of pericardial effusion. Under thyroid extract the heart can be seen to shrink back to more or less normal size, but digitalis is without effect. Not all cases show striking enlargement of the heart, and in some the fact of enlargement is proved only by the specific action of thyroid extract in causing a reduction. The difficulty in establishing slight changes in heart size is recognised by Savy and his co-workers, and they appear to have eliminated the common sources of error. They recognise two ways in which angina of effort, which is not rare as a complication of myxœdema, may react to the specific treatment. Most often the pain is aggravated, sometimes even with minimal doses. Less commonly, as in the case reported by Dr. Beaumont and Dr. Robertson in our issue of March 25, the pain is abolished. The need for caution in the treatment of any case complicated by angina is emphasised, because of the probability that the attacks will be aggravated, and a number of cases of cardiac infarction are reported, in the presence of which it is held that thyroid is especially dangerous. Hypertension, though found in only a quarter of the cases, was sometimes abolished by treatment; but a previously normal arterial tension may be raised, or hypertension be aggravated, with the result that treatment has to be discontinued. The electrocardiogram shows changes which are well known, the voltage of all waves, especially T, being reduced. Conduction defects have also been reported, which (like the low-voltage waves) are corrected by treatment with thyroid extract. Myxœdema appears at a time of life when degenerative cardiovascular disease is likely to complicate the picture, and if the effects of the two conditions are clearly distinguished, myxœdema will probably be found to disturb cardiac function less than has been thought.

MILK-BORNE SCARLET FEVER

IN describing a recent outbreak of scarlet fever in Denmark Juel-Henningsen and Ernst [1] paint a picture as vivid as that which H. H. Scott provides in "Some Notable Epidemics." If the plot of all these stories is more or less the same, the detective work entailed is always interesting. The Danish outbreak began on April 13, 1937, with the notification of about 20 cases of scarlet fever in Vejle, a community of about 25,000 people. On April 14 the outbreak culminated with the notification of about 40 cases. As most of the patients had been supplied with milk from the same dairy its owner was questioned, and he was able at once to state which was the milk cart and which were the farms providing milk for the part of the town where infection had broken out. Medical inspection of the farms led to the discovery of a hitherto undiagnosed case of scarlet fever in a milkmaid whose hands were peeling, and one of whose ears was discharging pus. She was at once admitted to hospital, and all the dairy's milk was pasteurised. The prompt elimination of the milkmaid as a source of infection was doubtless the reason why the outbreak ceased as abruptly as it had begun. The bacteriological examination revealed Lancefield's group A and Griffith's type 3 *Streptococcus pyogenes* in the pus from the milkmaid and in 108 of the 118 cases of scarlet fever. As in most such outbreaks the infection of the milk is maintained by mastitis in one or more cows, diligent search was made for disease of the udders in those that had supplied the offending milk. But though every cow was examined twice at an interval of six days, and the aid of the State Veterinary Serum Laboratory and of the State Serum Institute was invoked, neither the cows nor their milk proved to be infected. The milkmaid therefore seems to have been alone responsible for this outbreak, and it is remarkable that though raw milk is a poor culture-medium for the germ in question, and the cows did not coöperate in spreading the infection, she still succeeded in giving scarlet fever to 118 persons and angina faucium to about 50 others.

1. Juel-Henningsen, E., and Ernst, J., *Ugeskr. Laeg.* March 9, 1939, p. 298.

THE ROYAL ACADEMY, 1939

A PAINTING that was outstanding in the exhibition of the Medical Art Society last October has received the honour of being hung in the principal gallery at this year's Royal Academy. It is Alexander C. Dalzell's "The Aude Valley" (186), with its remarkable sense of land formation. In this sense it is almost a scientific study, yet it holds its own with its neighbours as a landscape painting of real originality. The painting commonly acclaimed as the picture of the year, "The Nativity" (215), a tempera by Miss Louisa Hodgson, is a very ordinary hospital scene of a mother with her baby, the doctor and father standing by; but the painting is heightened in meaning by the treatment, in manner and subject. The people have a kind of skinny solemnity, and the working men in prayer are almost too obviously shepherds in modern dress. A number of portraits, always the main standby of the Academy, have medical and scientific interest. The white stone bust of the first Lord Moynihan of Leeds (1203) by Sir W. Reid Dick is a notable likeness. Miss Flora Lion's large portrait of Lady Dawson of Penn (562), in a mauve dress, although not comfortably composed is gracious. The presentation portrait by Edward Halliday of Prof. W. E. S. Turner (659), seen in his laboratory but wearing academic robes, is a model of what a portrait of a scientist should be, the wall charts and apparatus enlarging and not swamping the character interest. Finally it should be said that the architectural room at this year's Academy contains excellent illustrations of the many fine hospitals recently built in this country or contemplated, including the new St. George's Hospital, the new outpatient block of the Royal Northern Hospital, and the Wingfield-Morris Orthopædic Hospital, Oxford. There is a spacious impression of the Birmingham Hospitals Centre (now the Queen Elizabeth Hospital), and a model of the Medical Research Building, Mill Hill.

METHÆMOGLOBINÆMIA AFTER SULPHANILAMIDE

SINCE the introduction of sulphanilamide into therapeutics cyanosis has been recognised as a not uncommon complication of its use. The cyanosis was at first attributed solely to the presence of methæmoglobin, sulphæmoglobin, or both pigments, and in many cases of cyanosis absorption bands due to these pigments can readily be detected by spectroscopic examination of the blood, and the quantity present can be estimated as the difference between total hæmoglobin and oxygen capacity. In one case Bensley and Ross [1] found over 25 per cent. of the hæmoglobin in the form of methæmoglobin. The smallest quantity they were able to detect with a hand spectroscope was about 0·4 g. methæmoglobin

1. Bensley, E. H., and Ross, J. B. *Canad. med. Ass. J.* 1937, **37**, 62.

per 100 c.cm. blood. Many cases of cyanosis are however met with in which abnormal pigments cannot be found on spectroscopic examination, and Marshall and Walzl [2] and Chesley [3] have shown, by comparing the oxygen or carbon-monoxide capacity of the blood with the hæmoglobin content calculated from the blood-iron, that in these cases all the hæmoglobin is present in available form and the cause of the cyanosis must be sought elsewhere, perhaps in the form of coloured oxidation products of the drug itself. It is clear from the literature that the incidence of cyanosis and of sulphæmoglobinæmia and/or methæmoglobinæmia varies much from clinic to clinic, and while traces of methæmoglobin in a person with a reasonable hæmoglobin level are of no importance, in a person who is already anæmic the inactivation of 30 per cent. or more of the total hæmoglobin may be serious. It is therefore of great importance that a way has been found of rapidly abolishing the methæmoglobinæmia due to these drugs.

Following a suggestion made by Wendel,[4] whose results have now been published in full, Hartmann, Perley, and Barnett [5] have found that methylene-blue is an effective antitode. Both sets of workers found methæmoglobinæmia in the great majority of patients receiving 0·1 g. sulphanilamide per kg. of body-weight per day, and significantly high levels of methæmoglobin in a large number. The degree of methæmoglobinæmia was not proportional to the blood-sulphanilamide level. By the administration of methylene-blue intravenously, in doses of 1–1·5 mg. per kg. of body-weight in a 1 per cent. solution, the methæmoglobin and cyanosis disappear dramatically in the course of 30–45 min., whereas without methylene-blue they may take a day or two to disappear after sulphanilamide is stopped. The methylene-blue is equally effective if taken by mouth in four-hourly doses with the sulphanilamide, the dose suggested being 65–130 mg. (gr. 1–2), and there is no evidence that this interferes with the action of the sulphanilamide. Methylene-blue produces no major toxic effects, though when given by mouth it sometimes causes vomiting and diarrhœa, and special care should be taken when giving the drug intravenously, because extravasation is painful and may lead to necrosis of the tissues round the vein. It is not suggested that methylene-blue should be given as a routine with sulphanilamide, but in a seriously ill patient who develops cyanosis it will allow sulphanilamide to be continued without risk.

SUBCUTANEOUS IMPLANTATION OF DESOXYCORTICOSTERONE

SINCE Deanesly and Parkes [6] first showed that hormones can be administered by implanting tablets under the skin the method has been used clinically for giving œstrone, testosterone and progesterone. The technique is simple: the tablets are sterilised in an autoclave at 100° C., or even more simply in a test-tube of boiling water, and are then inserted in the subcutaneous fat under local anæsthesia. In man their action does not seem to last longer than three months by which time the tablets so far given are completely absorbed; but a more prolonged effect might be obtained by using larger ones. From the sex hormones proper this method of therapy has been extended to desoxycorticosterone acetate, and Thorn, Engel and Eisenberg [7] report that subcutaneous insertion of two tablets of approximately 100 mg. each will maintain adrenalectomised dogs in good health for four or more months. Their studies were controlled by investigations of mineral metabolism and it is noted that normal serum values and a positive balance for sodium and chlorine were maintained. The weights of tablets removed at intervals suggested that 1 mg. of desoxycorticosterone acetate was utilised per day, whereas 1·5 mg. was the dose necessary to get a similar effect from daily injections. In this country Levy Simpson [8] has already reported the successful use of implanted tablets in Addison's disease, having inserted four tablets of 50 mg. desoxycorticosterone acetate (total 200 mg.) in each of four patients. In an additional note [9] he says that, as with other hormones, the effect lasts about three months. As the rate of absorption depends on physical laws and not upon physiological demands, extra effort or infection calls for additional therapy. The great advantage of the method is the obviating of injections, but this can also be attained by inunction, for Levy Simpson finds that desoxycorticosterone acetate, like œstrone and testosterone, is effective when applied to the skin. Inunction may therefore prove to be the method of choice, but at present the larger quantity needed for cutaneous absorption is an important consideration in view of the high cost of the drug.

FUNCTIONAL DISORGANISATION OF THE KIDNEY

DURING the last few years our knowledge of renal physiology has been extended largely owing to the discovery, in inulin, of a substance which is excreted solely by glomerular filtration and is unaffected by the tubules. By comparison of their clearances with that of inulin the substances excreted by the human kidney can be divided into three main classes: those, like inulin, which are filtered off by the glomeruli, and subsequently untouched by the tubules; those, like creatinine, which are apparently excreted by tubular activity as well as by glomerular filtration; and those, like urea and sugar, which are filtered off by the glomeruli and reabsorbed to a greater or less extent by the tubules.

The mechanism of glycosuria and the meaning of a threshold for glucose have been considerably elucidated by the demonstration by Shannon and Fisher [10] that the tubules are capable of reabsorbing glucose from the glomerular filtrate up to a certain maximum amount per unit time, whatever the level of the blood-sugar; only if the amount of glucose in the glomerular filtrate exceeds this maximum does glucose appear in appreciable quantity in the urine. The fact that the glomerular filtration-rate seems to be reasonably constant in a normal man explains the apparent stability of the renal threshold for glucose under ordinary circumstances. On the other hand it has been realised for many years that in diabetic coma there may be very high blood-sugar with practically no renal excretion of glucose. A number of cases of diabetic coma have recently been studied by McCance and Widdowson [11] who

2. Marshall, E. K. jun., and Walzl, E. M., *Bull. Johns Hopk. Hosp.* 1937, **61**, 140.
3. Chesley, L. C., *J. clin. Invest.* 1938, **17**, 445.
4. Wendel, W. B., *Ibid*, March, 1939, p. 179.
5. Hartmann, A. F., Perley, A. M., and Barnett, H. I., *Ibid*, 1938, **17**, 699.
6. Deanesly, R., and Parkes, A. S., *Proc. roy. Soc.*, B, 1937, **24**, 279.
7. Thorn, G. W., Engel, L. L., and Eisenberg, H., *Bull. Johns Hopk. Hosp.* March, 1939, p. 155.
8. Simpson, S. L., see *Lancet*, 1938, **2**, 1414.
9. Simpson, *Proc. R. Soc. Med.* April, 1939, p. 689.
10. Shannon, J. A., and Fisher, S., *Amer. J. Physiol.* 1938, **122**, 765.
11. McCance, R. A., and Widdowson, E. M., *J. Physiol.* 1939, **95**, 36.

show that this phenomenon is only one aspect of a wide derangement of renal function; in particular the relationship between the inulin clearance and the creatinine and urea clearances is quite different from the normal one and in some cases the level of chlorine in the blood is high while the urinary concentration is low. On another page Dr. Allott describes a number of patients suffering from various conditions, but not from renal disease, in whose blood sodium and chlorine were retained though these substances were almost completely absent from the urine; other electrolytes were dealt with normally. It will be remembered that J. G. G. Borst[12] observed a similar failure to excrete sodium and chlorine after hæmatemesis.

The work of Shannon and Fisher suggests a possible explanation of the high threshold for sugar in diabetic coma. If the glomerular filtration-rate is cut down (and in fact, owing to low blood-pressure, it is much less than normal in many cases) the absolute quantity of glucose in the glomerular filtrate per unit time may not be more than can be completely reabsorbed by the tubules; in this case, notwithstanding the high concentration of glucose in the filtrate, no sugar will be excreted although the blood-sugar is above normal. It has recently been shown[13] that a similar mechanism of glomerular filtration with tubular reabsorption up to a certain limit explains the excretion of ascorbic acid, but at present we do not know whether any similar mechanism plays a part in the excretion of electrolytes. It will be recalled that with the isolated kidney a very hypotonic urine is secreted, and the concentration and total amount of chloride is greatly increased by addition of posterior-pituitary extract to the perfusion fluid. Possibly the explanation of the abnormal metabolism of sodium and chlorine in these patients may lie in some interference with the secretion of a pituitary or other hormone, rather than in a pure filtration-reabsorption mechanism corresponding to that for glucose. In the cases described by Allott, for example, the various central nervous lesions found may have disturbed in some way the secretion of a pituitary hormone, and have thus led indirectly to the abnormal electrolyte metabolism.

CYCLOPROPANE

CYCLOPROPANE seems to be steadily increasing in favour as an anæsthetic, though its peculiar properties and the need for special apparatus if it is to be properly given are likely always to restrict its use. It is a highly potent anæsthetic and one to which the ordinary criteria of the presence and depth of anæsthesia do not apply. More work, both experimental and clinical, has been done on its properties in America and Canada than in this country, and a useful summary of this is now available in a report of the council on pharmacy and chemistry of the American Medical Association.[14] Experimentally cardiac irregularities have been shown to be common when cyclopropane is inhaled, but, as Seevers and Waters point out, almost every anæsthetic can be shown to produce such irregularities if its clinical use is subjected to electrocardiographic examination. Cardiac arrhythmias and the like are of little import except when unusually high doses of the anæsthetic are being used. Pharmacologically cyclopropane stands the test of experimental investigation well, no organ suffering tissue change or functional depression to an injurious degree when the gas is used within fairly wide limits of strength. Most people lose consciousness if the inhaled vapour reaches 6 per cent., and it is not generally known that sub-anæsthetic concentrations—3–5 per cent.—produce analgesia if continuously inhaled. The great difference between cyclopropane and the other commonly used inhalation anæsthetics is that the former alone never acts as a respiratory stimulant. This has the advantage of ensuring that respiratory movement will not be embarrassingly violent, and indeed the expert with this gas can sometimes abolish respiratory movement entirely to facilitate the surgeon's task. However safe such a manœuvre may be as regards risk on the table, it may possibly lead to trouble later, and perhaps the most formidable objection to cyclopropane is the occasional occurrence of massive atelectasis after its use. This sequel is attributed to the deficiency of inert gas in the pulmonary alveoli consequent on the high percentages of oxygen employed with cyclopropane, and the use of helium, an inert gas slowly absorbed from the lung, is therefore recommended in association with cyclopropane. Until fairly recently cyclopropane was not easily obtained in this country, but this difficulty has now been removed.

12. See *Lancet*, Feb. 11, 1939, p. 339.
13. Ralli, E. P., Friedman, G. J., and Rubin, S. H., *J. clin. Invest.* 1938, **17**, 765.
14. *J. Amer. med. Ass.* March 16, 1939, p. 1064.

CEREBRAL DAMAGE FROM CAROTID LIGATURE

A REPORT of gross cerebral damage after ligature of the left external and internal carotid arteries for intractable epistaxis[1] serves to remind us how little precise knowledge we have of this catastrophe. It is difficult to estimate the risk in a given case and although observation of the effect of temporary arrest may be the means of avoiding some immediate accidents, there still remain those of late onset which elude prediction or prevention. Fetterman and Pritchard discuss four mechanisms; anomalies of the collateral circulation, thrombosis and embolism, stimulation of the cervical sympathetic and stimulation of the carotid sinus. In their case hemiplegia developed immediately after ligature but the patient survived for more than a year; post mortem no posterior communicating artery was found on the left side. Thrombosis and embolism are held responsible for late accidents but they cannot always be demonstrated at autopsy. There are several indications for carotid ligature and the risks of cerebral damage must vary accordingly. In hæmorrhage it is not likely to be undertaken except as a last resort and the exsanguine state of the patient must increase the chance of cerebral damage. When it is done for the removal of malignant tumours the actual ligature is but an incident in an extensive operation, which is apt to cause shock and to aggravate its effects. In aneurysm—perhaps the commonest indication—it might be supposed that the obstruction already present would ensure an adequate collateral circulation. In many cases it probably does; but, as Jefferson[2] has remarked, an intracranial aneurysm may have the opposite effect, although this is less probable with arteriovenous than with saccular arterial aneurysms. Pilcher and Thuss[3] discussed the effect of aneurysm on the collateral circulation and rejected it as a safeguard on the basis of Pilz's figures which were, however, published 70 years ago; it was in 1868 that he reported 30 per cent. of cerebral complications following ligature for aneurysm

1. Fetterman, J. L., and Pritchard, W. H., *J. Amer. med. Ass.* April 8, 1939, p. 1317.
2. Jefferson, G., *Brit. J. Surg.* 1938, **26**, 297.
3. Pilcher, C., and Thuss, C., *Arch. Surg., Chicago*, 1934, **29**, 1024.

and similar conditions. In 1935 Matas [4] reported damage to the brain in 11 per cent. of 80 ligatures, but there do not seem to be any recent records of large series in which distinction is drawn between cases with and without previous obstructive lesions. It is desirable that the risk of carotid ligature should be examined in the light of modern experience and that the conclusions drawn from pre-Listerian surgery should be reconsidered. Such an examination should take into account the indications for ligature and must discriminate between cases with and without obstruction, subdividing the former group according to the site, intra- or extra-cranial, of the obstruction.

OPERATING IN A RESPIRATOR

IN the *British Medical Journal* last week Mr. J. S. Rowlands called attention to the possible difficulties of surgical operations during or after gas attacks. This subject has been discussed in the continental medical press—for example, by von Fehr [5]—and it is suggested that the war-time surgeon should learn to carry out his duties in a gas-mask, just as the army telephonist or gunner or infantryman learns to do so. Ideally of course it should never be necessary to operate in the presence of gas, for operating-theatres ought to be made gas-proof and splinter-proof; the conversion of Nissen huts to this purpose is described by Mitchiner and Cowell.[6] If such theatres are not available, however, and the surgeon and his team find themselves exposed to gas it would of course be essential for the whole team to be protected. The patient will already be safe, if he is having gas-and-oxygen anæsthesia, for his face is covered and any air given can easily be passed through the canister of a respirator. As for the surgeon and his assistants, there appears to be no insuperable obstacle to the use of respirators, apart from unfamiliarity. To complete the finer parts of a disarticulation at the cubometatarsal joint Mr. Rowlands found himself compelled to discard the "mask," but we understand that an appendicectomy has been successfully completed by Colonel Cowell wearing a general-service respirator. Before starting he carefully applied Anti-dim to his glasses and to the eye-pieces of the respirator both within and without. The haversack was hung over his back instead of in front, and the sterilised overall was tied loosely to allow of air-entry. The respirator was donned before washing up, and was worn for the 45 minutes till the dressing was applied. No difficulty was experienced in comfort, efficiency or visibility, and Colonel Cowell threaded his own needle. The wearing of the civilian-duty type of respirator would, he thinks, be much more comfortable and easier for all concerned.

EPANUTIN AND THE GUMS

EPANUTIN, or sodium diphenyl hydantoinate, is now receiving a fairly extensive trial in the treatment of epilepsy. Some time must elapse before its value can be assessed, because, as with the barbiturates, patients tend to become tolerant of the drug, and suppression or drastic reduction of the fits for a few weeks may not be maintained. Moreover, as we pointed out in a previous annotation,[7] toxic manifestations appear in a certain proportion of cases, and the drug should only be given under close supervision. Kimball [8] of Cleveland has observed what seems to be a new and rather serious sign of epanutin intoxication. Of 119 patients receiving epanutin at the Detroit special school for epileptics he finds that no less than 68 show some degree of hyperplasia of the gums, 17 of them having what he regards as advanced hyperplasia, though only 4 have spongy and tender gums that bleed easily. The hyperplasia is more common among patients who have complained of other toxic symptoms such as unsteady gait or periodic weakness. It usually comes on within a few weeks, and may be preceded by a transitory complaint of sore mouth and tender gums. The severity of the condition is thought to vary inversely with the amount of ascorbic acid in the blood, and yet the administration of ascorbic acid or of a diet high in vitamin C was not very effective either in raising the ascorbic acid in the blood or in reducing the hyperplasia. Kimball is so pleased, however, with the control of fits and the improvement in the mental and physical health of his patients that he does not think it justifiable to stop the epanutin on account of the gum trouble. He has not noticed any other symptoms of vitamin-C deficiency, such as joint pains, purpura or extreme weakness. If hyperplasia of this type is as common a result of epanutin administration as Kimball finds it, it is curious that it has not been observed before. But many epileptics have a high resistance to impressions of pain or discomfort, and it is therefore important that everyone who prescribes epanutin should add hyperplasia of the gums and gingivitis to the other evidences of poisoning for which he must carefully watch.

DR. N. G. HORNER, editor of the *British Medical Journal*, has been elected to the fellowship of the Royal College of Physicians of London under the rule permitting the election of non-members of the college who have distinguished themselves in any branch of the science or practice of medicine. We greatly welcome the recognition of this distinction.

The following have been appointed honorary consultant advisers on the organisation of hospitals in war-time in Scotland: Sir John Fraser (surgery); Prof. L. S. P. Davidson (medicine); Prof. R. W. Johnstone (maternity services); and Dr. J. H. MacDonald (nervous disorders).

The Minister of Health announced on Friday that the provisional maternal-mortality figures for England and Wales showed a further reduction from 3·13 per 1000 births in 1937 to 2·97 in 1938, the lowest rate on record. The annual report of the Department of Health for Scotland shows a maternal mortality-rate of 4·9 per 1000 for 1938, compared with 4·8 in 1937. In Scotland the general death-rate for last year was 12·6 per 1000 population, the infant-mortality rate 70 per 1000 births, and the tuberculosis death-rate 69 per 100,000, all these figures being the lowest recorded.

The UNIVERSITIES YEARBOOK for 1939 has just appeared. This yearbook which first appeared in 1914 has gone on improving and has now reached a form in which little change is required from year to year. In this issue the introductory chapter to the universities of Australia has undergone extensive revision, and information is given about the new University of Travancore. These are the only substantial additions, apart from the innumerable corrections of detail which make the book so valuable as a current work of reference. The price remains unchanged at 15*s*.

4. Matas, R., *Ann. Surg.* 1935, **102**, 923.
5. von Fehr, A., *Schweiz. med. Wschr.* April 15, 1939, p. 347.
6. Mitchiner, P. H., and Cowell, E. M., Medical Organisation and Surgical Practice in Air Raids, London, 1939.
7. *Lancet*, 1938, **2**, 956.
8. Kimball, O. P., *J. Amer med. Ass.* April 1, 1939, p. 1244.

SPECIAL ARTICLES

THE WIDER ASPECTS OF NUTRITION

A NATIONAL CONFERENCE

THE conference arranged in London last week by the British Medical Association was a mixture of the academic and the practical: it covered the theory of nutrition in the individual and the practice of feeding the community. There was general agreement that many people are not getting enough food, but the difficulty of assessing "dietetic" malnutrition in strictly medical terms was recognised. Members of the conference did not altogether agree, moreover, about the broad economic and political measures needed to defeat under-nourishment. In the session on British farming controversy turned on whether "protective" foods should be grown instead of "non-protective" foods. Discussion became more openly political over family allowances and extension of the social services.

After Sir KAYE LE FLEMING had welcomed the delegates and Lord HORDER as chairman had expressed a hope that the conference would lay the keel for a long-term food policy, Sir ARTHUR SALTER, M.P., gave an inaugural address in which he said one could not discuss nutrition without coming up against its economic and political aspects. Among the poorest of Sir John Orr's income groups, about 4½ million people, the consumption of milk, including tinned milk, was, he said, equivalent to 1·8 pints per head per week: compared with 5·5 pints in the wealthiest group. He would put as the first objective of economic policy the securing of an absolute minimum for the major items in the cost of living, particularly food and rent: at present milk was treated primarily as an important part of the incomes of farmers, and secondarily only as the most essential of foods. He viewed the widespread subsidising of private enterprise as "a form of bastard socialism," and advocated reform of the whole system of control in the public interest. As regards a war economy, since our current food stocks would suffice for periods ranging from an average of a few weeks to about three months, and the power of increasing home production was limited, he advocated the storage of food value equivalent to a year's supply of wheat, the total cost of which (about £5 million), was about 1 per cent. of our annual defence expenditure.

PHYSIOLOGISTS' VIEWS

Prof. E. P. CATHCART, F.R.S., said that apart from food the essentials for perfect nutrition included adequate sleep, fresh air, exercise and contentment of mind: uncertain wages might affect the last factor. Malnutrition might result from overeating: there was no reliable objective measure of the state of nutrition. The "biological value" of proteins was not a constant value but varies with the amount of protein in the diet—thus liver protein at a level of 8 per cent. in the diet has a biological value of 77, whereas at a level of 16 per cent. its biological value drops to 58. As evidence that a supplementary action can also come into play he said that if beef protein with a biological value of 69 is combined with flour proteins with a biological value of 35, in the proportion of 1 to 2, the combination possesses a biological value of 73—a value higher than that of beef itself. This supported the argument for a good mixed diet. Terroine, although he admitted that proteins of animal origin (meat, viscera, milk and eggs) take precedence over those of vegetable origin (legumes and cereals), considered that the inclusion of such "first class" proteins, although useful, is not essential. Prof. Cathcart considered that a diet made up of brown bread, butter, cheese, milk, vegetables and fruit would provide all the essential items. The slogan "Drink more Milk," however, ought to read "Drink more Safe Milk": pasteurisation did not reduce materially the food value of milk.

Sir ROBERT MCCARRISON held that while there might be disagreement on points of detail concerning nutrition there was no cause for controversy on the "simple truths" which might be constituted in the following three principles:—

(1) Nutrition is a fundamental function of the body on the efficiency of which health depends.

(2) Food is the paramount influence in determining man's general physical endowment, powers of endurance and resistance to disease.

(3) A well-constituted diet made up of fresh natural foodstuffs contains all things needful for normal nutrition, so far as food is capable of supplying them, always provided that those derived from agriculture are produced in unimpoverished soil.

He contended that if foodstuffs are fresh, natural and of a proper kind, a healthy appetite would take care of the quantities required to satisfy physiological needs—including both the known essentials and those we do not know. Sir Robert defined nutrition as the sum of the processes—respiration, mastication, digestion, absorption, circulation, assimilation and excretion—concerned in the growth, maintenance, and repair of the living body as a whole or of its constituent parts. The efficiency of the function of nutrition depended on the efficiency of all the processes or actions by which fitness is maintained, factors additional to the above being food, sunlight, fresh air, water, exercise and rest, and avoidance of excesses, particularly in food and alcohol. Lack of food produced what he would call the "dietetic" type of malnutrition. Exercise was an essential part of nutrition, but the dietetic factor must not be neglected. Adaptation to heat and cold, wind and rain, sun and soil, altitude and sea-level, and changes in climate and diet was also an important factor in nutrition, which, if cultivated, stimulated all organic functions: discipline of the body and obedience to natural laws must be observed. Since "fragmentation" of foodstuffs and their relation to the structure and function of the body was not yet complete, it was necessary to adhere to the third of the principles enunciated, and he advocated an extension of the "Oslo breakfast," and the provision of an abundance of milk and vegetables.

Dr. G. P. CROWDEN described a calculation from which it appeared that the total supply (home and imported) of certain of the dearer foodstuffs—such as meat, fish, eggs, and butter—would exceed the total requirements of the population if the B.M.A. dietaries were generally adopted. The supply would however be insufficient in respect of flour, other cereals, cheese and vegetables other than potatoes, and extra milk for the children: a third of the meat, three-quarters of the flour and other cereals, half the butter, four-fifths of the cheese, half the lard, half the vegetables other than potatoes, and three-quarters of the sugar would still have to be imported failing increased home production. Dr. Crowden

suggested that a return to the land by factory workers would be beneficial.

Dr. G. C. M. M'GONIGLE said that the optimum quantities of food were not so clear as the minimum, but there was bound to be waste, and in "practical" dietetic work he therefore favoured a considerable addition to the minimum diet, as a "factor of safety." He thought the British working man's wife was not so inferior at cooking as some scientists assumed, and in fact there was no evidence that bad cooking destroys more nutritive value than good cooking. This was merely an assumption.

NUTRITION AND THE PUBLIC HEALTH

Prof. V. H. MOTTRAM, delivering the Sir Charles Hastings lecture, remarked that "the early Victorians didn't wait to construct their drainage system until the science of bacteriology was founded, and there was no need for us to wait until the dietitians knew the last word." A working rule was to incorporate calories, proteins, inorganic elements and vitamins in the British diet and then rely on appetite. There was evidence of poverty since according to Sir John Orr's investigation many spe[illegible]less than 4*s*. per week on food, although [illegible]pest imaginable daily diet (5 oz [illegible] 1*d*. brown bread, 1*d*. cabbage and [illegible]poonful of cod-liver oil) cost over 4*s*. a week. In any rationing scheme bread, which gives the "elasticity" of our calorie intake, must be excepted. He mentioned the observation by R. A. McCance that in throwing away the water after boiling cabbage the loss of calcium on 100 g. cabbage was only 3 mg., and if boiled in London tap-water there was actually a gain in calcium content. Probably the only nutritional loss in canned food concerned vitamin B_1; about half the vitamin C was retained.

AGRICULTURE

Ways in which production might be stimulated were described in two sessions, one on Home Agriculture, the other on Overseas Producers.

At the first session, with Sir JOHN RUSSELL, F.R.S., in the chair, a paper was read by Lord ASTOR in which, after describing lack of purchasing power as the fundamental cause of malnutrition, he advocated the redirection of government subsidies in favour of "protective" foods (milk, eggs, vegetables, fruit, potatoes) instead of the "non-protective" foods grown chiefly in the eastern counties. Owing to rearmament the amount of money available for agriculture was limited, and he thought it would be more economically spent in this direction, and that the importation of wheat, sugar, bacon, butter and cheese should be encouraged. At present the home output of wheat was less than 3 per cent. of that consumed, and that of sugar only slightly over 2 per cent.; whereas home dairying and livestock satisfied 70 per cent. of the demand and egg production had increased by some 200 per cent. since 1913.

Mr. K. A. H. MURRAY, Ph.D., showed how the home supply of protective foods has been increased by reducing labour costs (by mechanisation and by taking land out of cultivation) and by better yields from livestock, the principle being to increase the output at the same wage expenditure or to reduce the wage bill while maintaining the same output. He thought that a further increase in output might be achieved by increased technical efficiency; but until this was reached he considered that a subsidy should be granted.

Prof. W. C. MILLER stated that there are now 5000 herds attested free from tuberculosis, and that the efficiency of an attested herd as a milk-producing unit is increased by about 25 per cent. He regretted the control of food inspection by persons unqualified in animal disease.

In the discussion Mr. CLEVELAND FYFE, who spoke for "130,000 practical working farmers," maintained that Lord Astor's policy was not supported by them.

Mr. MONTAGUE FORDHAM estimated that Lord Astor's scheme would result in the unemployment of 250,000 workers in agriculture and industry, costing indirectly £75 million.

In the session devoted to overseas producers, Lord BLEDISLOE took the chair. Mr. F. L. MCDOUGALL explained that while six dominions, occupying 14 per cent. of the world land with a total population of 1·5 per cent. of the world total, had a production capacity beyond their needs, they were unable to find adequate export markets because international agreements put the interests of the producer before those of the consumer.

FOOD AND WAGES

In a session devoted to methods of stimulating consumption, with Lord SNELL in the chair, the case turned on family allowances or extended social services.

Mr. L. S. AMERY, M.P., wanted family allowances, which inter alia would check the decline of the birth-rate, which tended to "more bath-chairs to pull and fewer people to pull them."—Mr. L. J. CADBURY described the working of a family-allowance scheme at Bournville. The wage-rate of 56*s*. to 96*s*. per week was higher than that in many industries, but the family allowance was spent predominantly on food, to a proportionately greater extent in the lower wage-groups. He thought that family allowances might be a partial solution to the falling birth-rate.—Sir KENNETH LEE described the family-allowance scheme operated by his company.

Mr. GEORGE GIBSON favoured an extension of the social services; he disagreed with earlier speakers that the French trade-unions were in favour of allowances; the depressive effect on wage levels had reduced the effect intended. He pointed out that the birth-rate was higher in areas where unemployment was rife, and said that in Germany the population had increased because marriage was encouraged by a loan, which was held to be paid off when children were born.

Dr. STELLA CHURCHILL wanted to see social services available to people who would not get the allowances —i.e., the unemployed, who, with their dependants, constituted 5–6 million necessitous cases. She spoke of the necessity of meals for children, not forgetting the holidays. Milk, she said, should be available for expectant mothers from the first month of pregnancy, and for toddlers from 2–5 years, who often got no extra nutrition; nursery schools were also urgently needed. With the consent of Lady (Rhys) Williams, Dr. Churchill described an experiment in the feeding of expectant mothers conducted over 4–5 years: 8770 mothers attending clinics were each given 6 lb. dried milk, 3 lb. Ovaltine and 1½ lb. Marmite for use throughout pregnancy (a comparable number of mothers served as controls). Figures collected from the investigation (to be published in June) strongly suggested that it might be possible along these lines to reduce the infant and maternal mortality-rates.

Dr. A. J. B. GRIFFIN observed that the wage-rates in Mr. Cadbury's investigation were exceptional. He considered that industry could pay, that the

family allowance was "another subsidy for bad wages," and that men should be encouraged to stand on their own feet. He thought it unnecessary to agitate against a low birth-rate while there were 2 million unemployed.—Mr. AMERY disagreed with those who attacked family allowances; he thought that reforms in the direction of social services really meant "Jam yesterday, jam tomorrow, but not jam today."

SCHOOLS

In the final session of the conference, Sir CYRIL NORWOOD took the chair.

Mr. W. O. LESTER SMITH advocated the closest possible contact between the school medical officer and the education service to ensure the pre-eminence of the claims of nutrition.—Prof. V. H. MOTTRAM wanted to see trained dietitians at the service of the maternal, child, and industrial welfare centres and thought that district nurses and sanitary inspectors should be familiar with the science.—Mrs. HENRY HALDANE considered that dietary change could be achieved only by a careful approach. She would undertake "simply by telling the story of scurvy to send a village audience away more convinced of the reality of deficiency disease and the need of fresh food than by recounting whole alphabets of vitamins." Likewise lectures entitled Growing and Keeping Your Teeth or How to Avoid Anæmia by Diet would be accepted more readily by a women's institute audience than a lecture on Food Values.—Mr. G. CHIPPERFIELD described how at camp many children "wouldn't touch milk pudding" and "didn't know how to tackle an egg," but they had usually acquired the habit before leaving.—Sir ALBERT HOWARD said that experimentally it had been found that school-children who were fed on properly grown vegetables ate 10 per cent. less than if the food was grown in ground fertilised with artificial manure, or was kept in cold storage: colds and measles did not spread among them, resistance being greater. Likewise animals properly fed ate less and yielded meat of better quality.

At the end of the conference the following resolution was passed without dissent:—

This conference, called by the British Medical Association and composed of representatives of medicine, agriculture at home and overseas, industry and education, is deeply impressed with the importance of nutrition to the national welfare. It urges upon the Government the formulation of a long-term food policy in which the requirements of health, agriculture and industry shall be considered in mutual relation. It is convinced that measures to secure the more ready availability to all sections of the community of foodstuffs which are held to be desirable on nutritional grounds should be accompanied by an educational campaign to encourage their increased consumption.

"Even those who have been most pessimistic about the boasted progress of our century must have been surprised by one recent development—the rapidly increasing callousness and cruelty of a large part of the world that claims to be civilized. . . . It is noticeable in the mild depreciation with which we receive the appalling reports of the mutilation and slaughter of children by motor traffic—reports running into tens and scores of thousands. It is noticeable in large sections of contemporary art and literature in which one of the most laudatory adjectives . . . is 'brutal.' The brutalities are of the machine. Where the individual is most completely lost, the callousness, sometimes almost unconscious for it is often the mere by-product of a false idealism, is most evident."—ALFRED NOYES, reported in the *Times*, April 29, 1939.

PARIS

(FROM OUR OWN CORRESPONDENT)

APPENDICITIS AND SEROTHERAPY

Dr. M. Weinberg of the Pasteur Institute, in a communication to the Academy of Medicine in February, commended the use of the antigangrene serum (which he introduced during the war of 1914–18) in all cases of appendicitis, especially those in which "material or moral" circumstances stood in the way of operation. His surgical colleagues have reacted to the suggestion with a certain emphasis, regarding the moment inopportune for such paradoxical counsel when practitioners are just beginning to understand that appendicitis brooks no delay and when the policy of immediate operation is leading to an improvement each year in the case-mortality. Surgeons, it seems, are unable to picture the material or moral circumstances which forbid operation except in the case of a traveller in the Sahara or other remote spot—where he would in fact be as little likely to find the serum as to find a surgeon. In the surgical view nothing should encourage the practitioner or the patient to believe that there is a medical treatment of appendicitis. The only result of this would be an increase in the late operations with all the well-known disastrous results. Prof. H. Vincent, who introduced the antityphoid vaccination in the army, now in general use throughout France, spoke at the March meeting of the academy on the successful use in appendicitis of his own serum against *B. coli*, but he offered it only as a help to the surgeon in toxic or gangrenous forms of appendicitis.

THE FRIEDMANN VACCINE

There has long been bitter controversy over the use of this vaccine against tuberculosis. The starting-point was a claim made by tuberculous war pensioners to be treated free of cost with the Friedmann cure as they were entitled to be by orthodox methods. They had been told by similar German groups of the good results obtained there. Prof. Friedmann, who is now living in exile, has resumed his scientific work at Monte Carlo. For several years during which it was in abeyance imitations of his product were launched under his name with results that brought discredit on the method. The genuine vaccine now being produced has found new advocates and controversy has been renewed. There has been of late in France a wide extension of sanatorium treatment and the old veterans and the newer civilian patients have secured the ear of deputies specially interested in social welfare. This has led to the appointment by M. Marc Rucart, minister of health but not himself a doctor, of a committee to organise a thorough investigation. This will not be on human material but on bovines, in a research laboratory of the official school of veterinary medicine at Alfort, near Paris. The economic loss on bovine tuberculosis is itself sufficient reason for the investigation. The Minister proposes to investigate only the genuine vaccine controlled by Friedmann himself.

THE IRON LUNG IN FRENCH HOSPITALS

France, which up to now has not had the privilege of a Lord Nuffield to provide its hospitals with iron lungs, may solve the problem in another way. A broadcast appeal has brought in a sum of 800,000 francs and a committee has been appointed by the Minister of Public Health to ascertain the most suitable type of respirator among those at present

in use. From this beginning it seems probable that in a short time all the larger hospital centres in France and North Africa will have an iron lung which is most likely to be wooden. Those who read Dr. C. L. G. Pratt's letter in your issue of Jan. 28 will recall that the first mechanical respirator was devised by a French clinician, Dr. Woillez, who described a form of congestion of the lung which now goes by his name. Dr. Woillez demonstrated his apparatus in 1876 at the Academy of Medicine, in whose bulletin were published the two engraved plates which you reproduced with Dr. Pratt's letter. The pump was worked by hand, a feature that might well prove useful should electric power be put out of action, for instance during an air-raid.

Prof. Laignel-Lavastine of the International Neo-Hippocratic Society has sent to leading medical men in various countries a letter asking for support for the second congress to be held in France towards the end of the present year. Neo-hippocratism, since the idea was launched some years ago from London by Cawadias, has found acceptance in medical circles here, official and non-official, as a meeting-ground for homœopathic and allopathic doctors.

A physician acting as social insurance controller lost his own self-control enough to tell a patient in a loud voice what he thought of the surgeon who had treated him. The surgeon, who has a high standing in Paris, having heard of what had happened, sued the controller for slander and was awarded 1000 francs in damages. The fine will be paid by the *caisse*, regarded as responsible in civil law.

The French Society for Serology, founded in 1931, has extended its activities and its title to chemotherapy. At a special meeting held in Paris the guests of honour were Dr. P. R. Peacock (Glasgow) and Prof. Maisin (Louvain) who delivered lectures respectively on serology and the diagnosis of cancer.

Prof. Pachon, one of the leading French physiologists, has died in retirement. His life work was principally on blood-pressure and the instrument for its measurement, the *oscillomètre Pachon*, is still in use with slight modification in most Latin countries. He spent his life in laboratory work and in teaching, and was the perfect type of *savant* eager only for the discovery of truth behind the complexity of natural phenomena.

UNITED STATES OF AMERICA

(FROM OUR OWN CORRESPONDENTS)

THE DOCTOR AND THE SOCIOLOGIST

AT a meeting on health insurance convened by the American Association for Social Security on April 14 and 15 the views of the American Medical Association were presented by Dr. Morris Fishbein, editor of its journal. If the indigent in the United States are not getting medical care in every case, he said, it is because the social-welfare profession have failed miserably in bringing the sick to the sources of such care. However, the indigent in this country are better cared for than in any country in the world. Health insurance, in Dr. Fishbein's opinion, exalts administration above service. It results in a low grade of practice and if introduced under the Wagner bill would put medical care under political control.

Miss Helen Hall, president of the National Federation of Settlements, spoke in favour of health insurance and especially of the British health-insurance administration. She paid a tribute to the friendly attitudes of the British working classes to those who had come over to inquire regarding their experiences under health insurance. "Lor, miss," they had said to her, "Ain't your accent funny! We thought it was just made up for the movies!" She hoped that any scheme for health insurance introduced in the United States would provide for the entire family.

Dr. Hugh Cabot put "the case of the progressive doctor." He agreed with Dr. Fishbein that no-one wants complete security; but we do want a little less insecurity. In spite of good public-health statistics in this country, it is undeniable that large groups of people get nothing that can be called adequate medical care. Dr. Cabot then eulogised the standards of scientific medical journalism in this country. But medicine, he remarked, is not an abstraction. It may not be surprising that physicians are unable to keep abreast of sociology and economics; yet these are fields in which his advice will be asked. Excellent as are our medical publications in their own sphere, they are not so good in the sphere of economic and social problems. Too frequently we have been treated to special pleading and to dogmatism by writers who are ignorant of fundamental facts; too often there has been descent to emotionalism. Physicians find it difficult to realise that it is not possible to set up in social questions the type of experiment, with few variables and adequate control, to which they are accustomed in natural science. In sociology what we set up is a "trial," not an experiment, and crabwise we proceed by the old method of trial and error. The public recognises that physicians are experts in their own field and is willing to treat them as such; but the profession must not expect to be treated as expert in sociology and economics.

MEDICAL CARE IN THE COAL-FIELDS

A report on conditions of medical service and hospitalisation in the coal-mining areas of Southern West Virginia, Virginia, Eastern Kentucky, and Northern Tennessee has just been issued by the Bureau of Coöperative Medicine (5 East 57th Street, New York City). It is based on interviews with 787 miners and their wives, with 75 doctors and "30 or 40 other persons," and inspection of 38 hospitals. The report states that "the miners of these districts are receiving deplorable medical service from their camp doctors, are constantly opposed by them in any dispute with the companies, and at present have no means of forcing better standards. For these things they are paying regular fees of approximately $2,500,000 a year, plus another million in extra charges, of which a large proportion is diverted into the pockets of the companies and contract doctors who sublet the work."

The hospitals in this area are with almost no exceptions privately owned and run for profit by the doctors who work in them. They supply only about 2·5 beds per 1000 population and the men pay exorbitantly high rates for their support. Since the hospitals are maintained by per-capita payments, each patient is a liability. It is reported that one unmarried man living alone was discharged while still in a solid plaster cast from his armpits to his left ankle. There is a serious lack of trained nurses. The equipment, though fairly good for emergency surgery, is wretched in other respects. Medical records are so poor as to be of little assistance either in future sicknesses or in compensation hearings.

The miners are severely handicapped in obtaining medical and cash benefits to which they are entitled under the Workmen's Compensation Acts, because of the widespread company domination of doctors and hospitals. The bureau recommends the formation of voluntary non-profit group health associations.

VIENNA

(FROM OUR OWN CORRESPONDENT)

ERNST FINGER

Prof. Ernst Finger, formerly chief of the Vienna clinic for dermatology and syphilis, has died at the age of 83. He was educated at the universities of Prague and Vienna, and first held the post of chief assistant in the department for diseases of the skin at the Vienna General Hospital. In 1904 he was appointed director of the clinic. Under his guidance its fame grew, and students from all over the world were eager to attend his classes and to work under him. His books on diseases of the skin and the sexual organs, which were translated into many languages including Chinese and Japanese, added to his reputation. His chief interest was in the fight against venereal diseases, and in 1907 he organised a chain of centres for the treatment of gonorrhœa and syphilis throughout Austria, including a number of evening outpatient centres where men and women could obtain treatment without loss of working time. A follow-up department kept these patients under observation after they were cured. It was on his advice also that leaflets of instruction were distributed among the working classes. His work in the period during and immediately after the late war was especially valuable, for at that time the prevalence of venereal infection among the population was very high. Finger was the prime mover in an effort that was made to introduce a bill to the Austrian Parliament making the notification of venereal diseases compulsory, but the attempt was unsuccessful. In 1927 on reaching the retiring age he gave up his position at the clinic which has since been taken over by the University of Vienna. Finger's kindly interest in his pupils in all parts of the world never flagged, and many will remember him gratefully as a research worker, a teacher, and sociologist.

GOITRE IN AUSTRIA

A monograph on the prophylaxis of goitre by Prof. Wagner-Jauregg, published by the Ministry of Health, contains a remarkable body of statistical data on the incidence of this condition in Austria. In 1923–24 a systematic examination of all school-children in the country was carried out, the results being entered on a special form similar to that used in Switzerland by Bayard. The findings had to be entered by the school doctor under four headings: (1) no goitre; (2) incipient goitre; (3) slight enlargement of the thyroid; and (4) well-developed goitre. Altogether 686,000 children between 6 and 14 years were reported on, of whom 44 per cent. of boys and 49 per cent. of girls had a goitre in various stages. The highest rate was found in the mountainous province of Vorarlberg-Tyrol, which showed an incidence of 59 per cent. in boys and 63 per cent. in girls; the lowest was in the low-lying province of Burgenland, with an incidence of 16 per cent. in boys and 20 per cent. in girls. The corresponding figures for Vienna were 41 and 46 per cent. Prof. Wagner-Jauregg thought that these high figures represented an ephemeral wave of goitre, the legacy of the war and immediate post-war years, when food and especially vitamins were scarce. This is borne out by the results of subsequent examinations, though these have not been conducted on such a large scale. In 1931–32 the incidence of definite goitre had fallen in the worst regions to a tenth or less of what it was in 1921, and in 1937 the figures were even better. In 1924 preventive measures were instituted by the health authorities. Since then only iodised salt, as introduced by Grange in Geneva and Hunziker in Zurich in the 50's, has been sold to the public for ordinary use. This *Vollsalz* contains 5 mg. of potassium-iodide in each kilogramme of salt, or 1 part in 200,000, and its effect seems to have been highly satisfactory. Prof. Wagner-Jauregg also discusses the relation to goitre of deaf-mutism and endemic cretinism, both of which are relatively common in the mountainous districts. In cretinism iodised salt is expected to act not so much on the cretins themselves as on their goitrous progenitors.

MEDICINE AND THE LAW

High Court rejects Medical Certificate

IN Rex *v.* Boycott and others, ex parte Keasley, the High Court has quashed a medical certificate signed by two doctors which certified a boy to be an imbecile within the meaning of the Mental Deficiency Acts. Stanley Keasley, 11 years old, attended the Harpenden council school for some years. In 1937 the headmaster told his father that Stanley was to be medically examined. The examination took place, and the father afterwards received a letter from the Harpenden local education subcommittee stating that the boy was to be examined with a view to his transfer to a special school. The father strongly objected; he considered his son fit for ordinary elementary education; he had his son examined by his own doctor who reported him capable of being educated at the council school; this report was said to have been later confirmed by a specialist. In October, 1938, the father was notified that a certificate had been signed to the effect that the boy was incapable of being educated at the council school and it was suggested that he should be sent to a special institution. The father then moved the High Court for an order of certiorari to quash three documents—namely, (1) the certificate of Oct. 5, 1938, signed by two doctors and purporting (under the Mental Deficiency (Notification of Children) Regulations of 1928) to declare Stanley Keasley to be an imbecile; (2) a report of the same date by the first of the two certifying doctors; and (3) a notification dated Oct. 10, 1938, from the clerk to the education committee sent to the county council's Mental Deficiency Act committee, requesting the latter to consider the advisability of transferring the boy to the special institution. The father's motion cited the Herts county council, the Harpenden education subcommittee, and the two doctors as respondents.

It was possible to criticise the treatment of the boy's case in two respects. First, in making it the duty of the local education authority to ascertain what children are defective and whether a child is incapable of receiving instruction in a particular school, section 31 of the Mental Deficiency Act of 1913 stipulates that any case of doubt must be determined by the Board of Education. The father had asked that the matter be referred to the board

but his request was refused. It is not clear whether the act is meant to give a right of appeal to every parent who claims that his child is perfectly normal —in other words, whether the doubt is a doubt entertained by the parent or a doubt entertained by the local authority. The facts of the present case, said Lord Hewart, showed that a doubt did arise and that the case should have been referred to the board. But it was a second point which seemed to have had even more effect in inducing the court to quash the documents. Apparently the second medical practitioner who signed the certificate had never seen the boy. The judges said that this was most unfortunate; the certificate was calculated, though not intended, to mislead any person reading it into the belief that it was in truth and in fact the certificate of two independent medical men, given after both had examined the boy. It is by no means clear that the certificate of one doctor would not have sufficed. Section 31 applies an act of 1899 which requires certification by a duly qualified practitioner approved by the Board of Education. The 1899 act was repealed in 1921 and, so far as can be seen, the corresponding provisions in Part V of the 1921 act do not require two doctors to certify. The result seems to be that a certificate adequately signed by one doctor, and sufficient for its statutory purpose, was nullified by the addition of the signature of the second doctor who admittedly had not seen the boy. The High Court quashed the documents and presumably the matter will now be referred to the Board of Education. Meanwhile the boy, precluded by the certificate from continuing his education at the council school, has been at home receiving no education at all.

Certiorari is an ancient writ whereby the King's Bench Division examines the validity of some proceeding or decision in an inferior court. Last year, by a statute designed to simplify the procedure, the writ of certiorari, as such, was abolished; but the general machinery of review remains; applicants now ask for an order instead of a writ. From the beginning it was only proceedings of a judicial character which could thus be removed into the King's Bench Division by the process of certiorari and there questioned. Merely ministerial or administrative acts—e.g., the issue of a warrant by a justice of the peace—are not so removable. The respondents contended that the documents about Stanley Keasley were administrative acts. Some of them, indeed, must have been very near the line. The Lord Chief Justice ruled that the three documents must be regarded together as a single entity. He and his colleagues unanimously held that the certificate was created in such a way as to look like the decision of a quasi-judicial authority. An order for certiorari could therefore be justified. If the local authority, doing its best for the children entrusted to its care, finds that this litigation has merely delayed the sending of a child to an appropriate school in the spirit of the statutes governing these difficult cases, it must comfort itself with the reflection that the liberty of the subject has once more been vindicated.

Dentist's Successful Appeal

Critics of the Medical Acts occasionally complain of the absence of any right of appeal to a court of law against a decision of the General Medical Council to order the name of a medical practitioner to be erased from the Medical Register for "infamous conduct in any professional respect." The Dentists Act gives a right of appeal against the removal of a dentist's name from the register or against refusal to register a name. On appeal the High Court may "give any such directions in the matter as they think proper." Last week the divisional court reversed an order of the General Medical Council and directed that a dentist's name be restored to the register. The dentist, Mr. S. M. Buckley, had practised since 1906 in Oldham and is a justice of the peace for that borough. It was stated on his behalf that, when in ill health in 1936, he made two mistakes in "dental letters" of patients sent by approved societies under the National Health Insurance Act. One of these cases resulted in a payment to him of £3 4*s*.; this sum he refunded when the mistake was pointed out. For those two slips in a career of 30 years, said his counsel, Mr. Buckley was adjudged guilty of infamous professional conduct and it was ordered that his name be erased. On appeal Lord Hewart observed that Mr. Buckley had always taken the position that what he did was unintentional and that his errors and lack of diligence were due to his being harassed by illness. The Lord Chief Justice was anxious not to say a single word which might appear, even indirectly, to involve a reflection on the course taken by the council; he appreciated the care with which its proceedings were conducted. Nevertheless, when he looked at the material now before the court, he was satisfied that there was not sufficient ground for the council's decision. Humphreys and Singleton, JJ., concurred.

There is perhaps a possibility of distinguishing the dentist from the medical practitioner in respect of the right of appeal to the High Court. Erasure of a dentist's name is a total bar to practice. No unregistered person can practise dentistry, just as, under the recent statute, no unregistered person can practise as an architect—though there is a saving for the naval architect, the landscape architect, and even the golf-course architect. The architect whose name is taken off the register has the right to appeal to the High Court. So also has the solicitor who is struck off the rolls by the Law Society, and the registered pharmacist who incurs a like sentence for professional indiscipline. The veterinary surgeon can appeal to the Privy Council. Alone the registered medical practitioner cannot appeal to any tribunal or authority. The judges will not reopen his case unless the hearing by the General Medical Council can be challenged for bias or corruption or for neglect of the principles of natural justice. The council is the sole judge of all questions of fact at its disciplinary inquiries, the sole repository of the standards of proper professional conduct. The council, as the Queen's Bench declared in 1863, is the tribunal to whom the legislature has left the decision as being the best judges in this matter.

ROYAL MEDICAL BENEVOLENT FUND.—The annual general meeting of the fund was held on April 25 and the following honorary officials were re-elected: president, Sir Thomas Barlow, F.R.S.; treasurer, Dr. Lewis Glover; and secretary, Mr. R. M. Handfield-Jones. Dr. E. A. G. Dowling and Dr. F. C. Martley were elected vice-presidents, and the retiring members of the committee of management were re-elected with the addition of Sir Humphry Rolleston and Mr. Herbert Tilley.

During the past year the fund has helped 746 families, of which 627 were former beneficiaries who had their rewards renewed. In all £24,320 were distributed.

SOCIAL IMPLICATIONS OF MEDICAL DISCOVERIES

IN the Robert Rede lecture, delivered at Cambridge on April 28, Sir EDWARD MELLANBY contrasted the present insecurity against death by violence with the security against death by disease, showed how the latter was based on a rapid advance of medical knowledge, and called attention to some of the social and economic implications of that knowledge and the effects of lowered mortality-rates, longer life, and improved standards of health and physique on national and international life. The lessened death-rate in early life, the rapid raising of the average age of the population, and the lengthening of life were, he said, accompanied by an increase in the fatal diseases of later life, such as heart-disease and cancer. Other effects of medical discoveries were the increase in stature and a great decrease in bony deformities among young persons. It was true that many of the changes were produced by administrative actions of the government, but it was medical science that informed such actions. Other of the changes were due to personal action, such as the modern habit of cleanliness, derived from the knowledge of bacteria and infection. The scientist, however, had cause to complain of the great delay between discovery and public action, which sometimes was caused by economic and social restrictions. For instance, diphtheria could be cleared out of England at once by preventive inoculation of infants and children with diphtheria toxoid, as had been done in Ontario. At Hamilton, with a population of 175,000, not one case of diphtheria had been diagnosed in the last five years. Another example was the difference (due mainly to varying standards of nutrition) in physique and mortality-rate between the children of the poor and those of the well-to-do. It might be that economic and other considerations would prevent fuller advantage being taken of modern teachings on nutrition without much greater help from the government. Ultimately, perhaps, the state might guarantee the provision of a sufficiency of protective foods (milk, eggs, vegetables, and fruit) to all school-children. This would be a profitable action, and the cost of provision of such food would probably be saved by the diminished cost of medical services and by the increased efficiency of the people.

EFFECTS ON HOSPITALS

On the one hand, advances in the diagnosis and treatment of disease had led to an increased demand for hospital accommodation. The development of radiology, bacteriology, pathology, biochemistry, hæmatology, surgical control of sepsis, and anæsthetics, together with their technical apparatus, had made it more and more impossible for the sick to obtain the best medical attention without entering some public institution, and the expenses of hospitals had increased enormously. On the other hand, increased knowledge of preventive medicine, by eliminating disease, rendered hospitals, doctors, and nurses less necessary. Discoveries in preventive medicine were not so dramatic as discoveries of cures; consequently the prevention of disease was never regarded as an urgent matter, and its adoption was therefore slow. Its action, however, though slow, was sure and lasting, and there could be but little doubt that in the near future the reduction or elimination of disease by prevention would entirely alter the character of hospital practice and might greatly reduce the need for institutional treatment. Acute killing diseases of early and middle life could be expected to become less common and the chronic disabling diseases of old age commoner. The average age of patients in hospitals would probably increase, and, except for motor-car accidents, hospitals would become places for alleviation of suffering and of comfort for the aged rather than places where dramatic cures were performed and the sick restored to health. From an economic standpoint, especially as regards civic and voluntary hospitals, it was only by encouraging medical research and rapidly making use of its discoveries in preventive medicine that the present tremendously costly system could be controlled.

EFFECTS ON MEDICAL PRACTICE

The effect of additional knowledge on medical practice would be to change its nature, more work being directed to protection against disease, especially the protection of young people against diphtheria, whooping-cough, and measles, rather than to attending them when they were suffering from these diseases. The general practitioner's work, as at present carried out, might be greatly reduced—even seriously, from his point of view—in the near future. At first sight the future of the dental surgeon seemed even more precarious, in view of the knowledge already acquired of methods of building up sound teeth, gums, and jaws by proper nutrition; but it was equally certain that many parents would not carry out instructions in these methods. Improvement in the teeth might even increase the amount of dental work, because it would make the treatment of caries more worth while than it was at present, when a large part of the population was edentulous at thirty or forty.

The future of the public-health services was also difficult to see. Except for provision of centres for the medical care of children aged 2–5 and schemes for providing and controlling supplies of milk and other protective foods to the poor, there did not seem at present to be much reason for great increase in these services. On the contrary, the need for some of the established services, such as fever hospitals, tuberculosis institutions, and centres for the treatment of venereal diseases, ought to be less in the near future. There did not appear to be much support for the view commonly expressed that there would be a great expansion of the public-health services in the future, although it was probably true that this work would assume greater relative importance.

ADMINISTRATIVE ACTS

Any state scheme affecting health could only be as effective as medical knowledge at that time allowed it to be. However large and grandiose the scheme adopted, however costly, however well administered, the limiting factor for effectiveness must be scientific knowledge, a fact well illustrated by venereal diseases and by puerperal fever. This being so the success of the Cancer Act, which had recently been passed by Parliament, would depend on improvements in radiotherapy and on the opening up of new lines of attack, which could only be developed with more knowledge of the fundamental nature of cancer. The United States of America had recognised this fact and, instead of embarking on a state scheme for treating cancer, had set aside large funds for cancer research. Luckily we would be able to share in the fruits of their enterprise.

The whole position of state action in health matters,

Sir Edward concluded, wanted clarifying. Sentiment and public appeal associated with particular lines of action should be eliminated, and each proposition should be considered only from the point of view of results to be expected in terms of saving life and giving increased efficiency.

PUBLIC HEALTH

The Evacuation Plans

NEARLY all the local authorities in the reception areas have now reported on their survey of housing accommodation available for refugees from the cities, and the results are regarded as very satisfactory. The Minister of Health suggests (Circular 1800, H.M. Stationery Office, 1*d*.) that receiving and evacuating authorities should now get into contact with one another, and with the education and transport authorities, and should make detailed plans. Operation of the scheme is not to create any additional burden on the local rates of receiving areas.

A new memorandum on the evacuation scheme (Memo. Ev. 4, H.M. Stationery Office, 3*d*.) states that the object is to transport from crowded areas about 3 million persons, including school-children, younger children with their mothers, expectant mothers, and blind persons and cripples. They are mainly to go to occupied houses, because otherwise accommodation for 2 or 3 million people cannot be arranged at short notice, but suggestions are made for the use of empty houses, and the erection of a number of camps is being stimulated. Preparations for evacuation, transport, reception and arrangements for emergency rations and for allowances are discussed. Local authorities are asked to consider the provision of any medical, nursing or first-aid staff that may be necessary for the journey. They will not be responsible for transport, but the receiving authorities are asked to make arrangements at each detraining station for reception personnel; for sufficient sanitary and first-aid provision; for "rough accommodation," including bedding for the night, for train-loads which road transport may not be able to clear till the next day; for a meal and a supply of drinking-water; and for informing the responsible persons of the numbers to be taken to each setting-down point and of the time they are likely to arrive. The survey shows that enough accommodation is likely to be provided on a voluntary basis; the suggested instructions to billeting officers have, however, been framed on the assumption that householders merely unwilling to receive children might be compelled to do so.

The memorandum contains notes on the reception and education of school-children, the provision of communal meals and the organisation of recreation. The sanitary authority will be responsible for dealing with any outbreaks of infectious disease, but any additional cost of hospital services will not fall on the rates. The local emergency committee for nursing should be informed of the number of nurses and nursing auxiliaries needed to supplement the existing district nursing staff. The question of the continuance of the school medical and dental service will be dealt with in a memorandum to be issued by the Board of Education. If the influx of population requires, for medical treatment in the homes, reinforcement of the doctors in the area, the local emergency committee of the British Medical Association will arrange for the transfer of practitioners from other areas. The arrangements for payment for medical services to evacuated school-children are under consideration. No liability will fall either on the householder or the receiving authority.

L.C.C. Hospitals and Medical Services

The hospitals and medical services committee of the L.C.C. report that, during the last four years, nearly £2,000,000 has been spent on the improvement, modernisation and extension of the council's general and special hospitals.

The estimates for the coming year include the sum of £700,000 for further improvements, including preliminary work in connexion with the construction of a new general hospital at Tooting, extensive additions to St. Nicholas' and St. Pancras Hospitals and the construction of a new serum institute at Carshalton. Further schemes for modernising, extending and improving the hospitals will be put in hand during the year. At general hospitals there are to be new receiving wards and outpatient departments, additional maternity accommodation, nurses' accommodation and sanitary annexes. Ward blocks are to be reconditioned, institutions are to be adapted for the use of sick persons and boiler plants and laundries are to be improved.

The net maintenance expenditure for hospitals and medical services for 1938–39 is estimated at £5,789,500 and for 1939–40 at £5,930,300. The provision in respect of staff for 1939–40 shows an increase of £213,000 (over that of £3,450,200 in 1938–39), about half of which is accounted for by the introduction of the 96-hour fortnight for the nursing staff. The dental services, which formerly came under the education committee, have now been transferred to the hospital and medical services committee and this accounts for £40,000 of the increase. The consultant and specialist service will cost £4800 more; the total annual cost of this service is now £45,000.

The accommodation at St. Margaret's Hospital, Kentish Town, is to be increased from 81 to 90 beds and cots, in order to make room for a special vulvo-vaginitis unit for the treatment of girls from Stamford House remand home, Shepherd's Bush, and the nursing and domestic staff is to be increased.

The committee recommend a grant of £250 towards the cost of the Prophit Tuberculosis Survey instituted by the Royal College of Physicians to ascertain the type of individual in the young adult population most likely to develop pulmonary tuberculosis. This grant is recommended on the understanding that no report of the work of the survey shall be published without the council's approval.

First-aid Posts in London

The schemes submitted by 18 of the 28 metropolitan boroughs and approved by the Minister of Health provide for 131 fixed aid-posts, 5 cleansing stations and 34 mobile units. The Minister has now issued a list of the addresses of the hospitals, child-welfare centres, dispensaries, schools, public baths and other buildings selected as fixed posts. The recruitment of personnel for these posts is progressing rapidly. In addition to a doctor to be appointed by the local authority, each post requires on an average 60 auxiliary volunteer helpers. As stated in this column on April 15 (p. 898) the estimated total of posts required for the county of London is 200, so that about 12,000 women auxiliaries will be required. In all over 17,000 women have volunteered for this work, and of the 2600 men who will be required nearly 2300 have already been enrolled.

GRAINS AND SCRUPLES

Under this heading appear week by week the unfettered thoughts of doctors in various occupations. Each contributor is responsible for the section for a month; his name can be seen later in the half-yearly index

FROM AN AMATEUR JOURNALIST

I

THE journalist, so we are told, must have the capacity to interest people in everything. For this enterprise, then, members of our profession should be well equipped. We see life from every angle, our technical knowledge is of the stuff which is perpetually and universally interesting. We have the material, but have we the art of presentation?

Rarely, I think; for our training is antagonistic to certain essentials of journalism. We cannot purchase sensation at the expense of correctness; we qualify when others might be dogmatic; we tend to be diffuse rather than concise; we are accustomed to work on a large canvas. The journalist, in contrast, must aim at the dramatic rather than the scientific; he is not handicapped by our insistent hesitancy in respect to accuracy. In his turn, he is not without his inconveniences; his space is very circumscribed, his work approximates to the miniature.

* * *

A chance encounter with the editor of one of our dailies and admission of a *cacoëthes scribendi* resulted in the invitation to contribute something to his columns and he himself suggested the subject "Why does December depress you?" In point of fact it had not struck me that there was depression in the air, but we do not encounter some fourteen years of examinations for nothing. We learn that a question is there to be answered, though for our bricks we may have little enough clay let alone straw: and I tackled the problem in the manner of the old campaigner. I presumed, therefore, the existence of widespread depression and sought for explanations which, speciously enough, should be related to the climate, and the influence of darkness and of damp, on the physical side. That was easy going, for everybody identifies these circumstances with infections, and illness and depression are correlated. Want of exercise at this time of year was a contributory factor. Then, a little daring, I brought in unemployment and the shadow of a general election and their effects on our spirits. Psychology of course could not be omitted and after a reference to the possibility of rhythm in life and, therefore, of cycles of elation and depression, I reminded my readers of the existence of Mark Tapleys and Mrs. Gummidges, winding up with the James-Lange theory of the emotions and the little girl waggling the dog's tail to make him happy.

Along came a brisk young lady whose mission it was to give me my first lesson in the art of journalism. They liked my Dickensian references—the public is always pleased when its acquaintance with the classics is assumed—and the bit about the little girl and her doggie was just the thing. But not much of the remainder had made an appeal to the sub-editor; my critical analysis had excited neither his admiration nor his enthusiasm. Many of the words I used must be replaced by more homely synonyms, sentences had to be strictly curtailed, and the whole thing was at least 30 per cent. too long.

I was not proud of the ultimate production nor could I be expected to be pleased with it; reconciliation to the sacrifices was not easy. But I felt bound to admit that there was much in this journalistic attitude; after all, you have to provide what is wanted, you cannot compel a public to like what you think it ought to like. Moreover the experience is salutary: to one whose natural style errs on the side of sesquipedalianism and perhaps wearisome over-elaboration, compulsory compression is a valuable exercise. But it is not easy. Three guineas I received for that article; and when some time later I encountered my editor friend and informed him, perhaps in a desire for commiseration, that the article had taken me three hours in its preparation, its pruning, and its polishing, he assured me that a production of that length—or rather brevity—within three hours should be regarded as no small achievement.

And since then I have been an amateur journalist—an innocent sort of addiction which enables one to declaim thoughts without the unpleasant consequences apt to follow upon itinerant monologue *coram publico*. And how pleasant it is on occasion to relax from a self-imposed subjugation, to write a medical article when space is comparatively unlimited and one can run riot with an orgy of cherished expressions for a select audience which will not challenge their meaning or appropriateness.

* * *

Not so long ago I chanced upon "A Short Autobiography of an 18th Century Physician" and was interested to learn that medical literature in his day was very much like that at the present. He referred to the same national differences that we remark: the futility of one; the ponderosity of another; the unreliability of a third. The author deplored the circumstance that the same sort of men wrote and refrained from writing as we observe at the present day: the younger men with plenty of time and ambition but little experience; the older men with plenty of experience, but, generally speaking, with little time and often less inclination to produce that for which the world might well be grateful.

So far as medical journalism for the public is concerned, I fancy there are two types of contributors, both of which are with difficulty restrained. One writes through an insistent craving to find self-expression and a satisfaction in contemplating the creatures of his brain. The other aims at self-advancement or more often is the victim of misguided obsession with a fanaticism which impels him, in a spirit of philanthropy, to dictate the laws of health to mankind through the medium of the popular press. Inevitably his enterprise, however motivated, must always be regarded with a certain suspicion as a form of advertisement and, therefore, of infamous conduct in a professional sense. But to my way of thinking, a more serious indictment is that so far from conferring a boon upon our fellow man by dictating the elementary rules of health, dietetics, and so on, such a proceeding is likely to be a disservice. There is no more enviable creature than the man who is profoundly ignorant of the machinery of his body: popular instruction on this subject is only too likely to make him introspective or morbid.

I sympathise with the mother who wrote to the schoolmistress vigorously protesting against the inclusion of physiology in Maggie's curriculum. "It don't do 'er no good and only makes 'er rude"!

* * *

But to return to the general principle. What indictment shall be extended to medical journalism as a whole? Nobody objects to the appearance in the lay press of a report upon a recent scientific discovery or a new treatment, for popular interest in medical science is and always will be perennial. But the writer should make it a condition of publication that his contribution is not accompanied by a puffing commentary and stipulate that his portrait shall not appear, lest he convey the impression that he is representing himself to be a pre-eminent authority whom it would be wise to consult in preference to any of his colleagues. It is all very well, however, for him to make in good faith any sort of stipulation. His wishes may be entirely ignored and his subsequent disclaimer may or may not receive sympathy. In some cases the disclaimer will be interpreted as additional evidence of his attempt to secure publicity.

Suppose he embarks upon a journalistic career which embodies the innocent pastime of utilising his special knowledge to impart a little information wrapped up as entertainment: to explain, for example, the cause of stitch or of sea-sickness, to inquire into the mental and physical pecularities of twins or the possible evils of tobacco-smoking, or to speculate whether it is worse to be deaf than blind. Or, again, to seek scientific justification for familiar proverbs such as "After dinner rest awhile"; "Laugh and grow fat"; "One man's meat is another man's poison"; "Feed a cold and starve a fever"; "Hunger is the best sauce"; "Bread is the staff of life"; "Cast not a clout till May be out." Should the author of these be accused of seeking undue publicity? Suppose that he wishes to write upon art, music, literature, photography, sport, or any other of the innumerable interests in which the doctor may be a gifted amateur, more especially as it has frequently been observed that members of our profession display the same whole-hearted devotion to their hobbies and avocations that is evident in their professional life, a faculty which makes their ex-cathedra pronouncements on any subject eagerly welcomed. Should he be charged with the accusation of seeking to attract to himself a practice through fame in an activity completely outside medicine? Actually, so far from his reputation in other spheres being of advantage to him professionally, it is only too likely to have the opposite effect: doubt and discredit are cast upon a doctor who sets up to be an expert outside his occupation; he should stick to his last. And yet, if write he must, he will never escape the possibility of criticism for an attempt at advertisement. The anonymity he might gladly seek whilst securing sufficient satisfaction through self-expression is not easily ensured. Unsigned articles on technical subjects make little appeal to the editor or the public for whom he caters. "A Doctor," "A Consulting Physician," or "A Harley Street Specialist" may conceal the identity of one of unexceptionable authority but most people are disposed to a different interpretation; and the signature which has come to be accepted as that of an expert in the particular subject enhances the value of an article from little or nothing to a thing of price.

Well, you cannot have it both ways and it is not surprising that many of our most gifted writers—and there are indeed gifted writers within our ranks—rather than incur the tiniest risk of criticism or censure prefer the absolute rule of refusing to allow one word upon any subject whatever to appear under their signature in the lay press.

* * *

As regards writing on the whole, I doubt if there is any body of educated men so reluctant to put pen to paper. The majority of doctors would rather waste ten minutes of their time and twenty minutes of yours, to say nothing of the irritation involved and the possibilities of error through instrumental distortion, by telephoning details which could be committed to paper in three minutes.

Panel and Contract Practice

Health Insurance in London

THE report of the London Insurance Committee for 1938 shows that there were 2241 practitioners on the committee's list, of whom 2086 were in general practice and 155 were medical officers of institutions. During the year 246 practitioners joined the list and 203 withdrew. The number of insured persons on the lists of practitioners was 1,890,701, compared with 17,861 on the lists of medical officers of hospitals and other institutions. The average number of insured persons per list for all practitioners was 852. There were 203 medical partnerships in London, 179 being partnerships of two practitioners, 18 of three, 5 of four, and 1 of five practitioners. During 1938 225 practices were transferred in whole or in part, and 15,110 patients transferred at the end of the quarter from one doctor's list to another's; this figure represents 0·8 per cent. of the medical register and suggests there cannot be widespread discontent with the services rendered. Postgraduate facilities are now available for insurance practitioners generally and during 1938 69 London insurance practitioners attended courses of study at the British Postgraduate Medical School and elsewhere. No fewer than 8,882,243 prescriptions were issued by insurance practitioners in London during the year, and it is probable that the number of consultations also approximated to this figure. It speaks well for the service that in spite of this vast total in only 19 cases—and some of those did refer to treatment—was any question raised which necessitated inquiry by the medical service subcommittee.

THE LANCET 100 YEARS AGO

May 4, 1839, *p.* 228.

From a leading article.

PLASTIC surgery has not been cultivated with so much ardour, in this country, as it deserves to be. While our columns have been enriched with several valuable original papers and cases by DIFFENBACH, of Berlin, the number of successful plastic operations in England has been inconsiderable. Lord LYNDHURST recently took his daughter to Paris to have the operation for cleft palate performed upon her,—Prince GEORGE of CUMBERLAND was sent to Berlin to submit to the operation of couching,—STROMEYER has invented the simple operation for club-foot. But what has latterly been done in the English Hospitals to promote English surgery, and to place it at least on a level with the surgery of France and Germany? Certainly little; and little will be done until surgeons who are not attached to hospitals enter the field.

LETTERS TO THE EDITOR

DIPHTHERIA—A PREVENTABLE DISEASE

SIR,—The introduction of compulsory immunisation against diphtheria in France and Hungary by recent legislation should cause health officers and other members of the medical profession in this country to consider the failure of voluntary measures to achieve protection of the child population against this disease. There would still be cause for anxiety if this feebleness of achievement were confined to remote areas of the country, but we cannot condone the complete lack of success in the large centres of population.

In a comprehensive review in your issue of Jan. 7 E. H. R. Harries quoted figures which show that the percentage of the population immunised is nowhere sufficient, and in most cases falls far short of the desired level of protection. It has been estimated that between 50 and 70 per cent. of the population under fifteen years of age must be effectively immunised before any significant reduction in the incidence of diphtheria will be apparent. Our progress towards this objective has been exceedingly slow in spite of the general agreement among health workers, for at least ten years, on the efficacy of active immunisation. The average figure for the London metropolitan boroughs in 1937 was 5·3 per cent. of the child population immunised (MacNalty 1938).

In hospitals for infectious diseases we have been impressed by the fact that few parents of the child patients, who are drawn from a wide area of London, are aware of the existence of measures for protection against diphtheria. We would therefore attribute public apathy largely to ignorance, and the charge of failure to inform the general public must be laid against the municipal authorities and the health officers.

A fuller education of the public is essential to ensure success. There are no valid objections to the methods of immunisation used at the present time and the inconvenience from the injections is negligible. Is it too much to hope that medical officers of health and medical organisations will undertake this task seriously and use propaganda to its fullest extent?

We are, Sir, yours faithfully,

A. A. CUNNINGHAM,
R. M. CAMPBELL.

Hither Green, April 24.

INTUSSUSCEPTION

SIR,—Mr. Frank Forty in your issue of April 22 points out that the enlarged mesenteric glands so constantly seen in intussusception must be present before its occurrence, and suggests that the enlargement is due to an acute enteritis which also brings about the intussusception by colicky contractions. The commonest variety of intussusception is the ileocolic with the apex in the terminal ileum: in the majority of these cases this apex will be found to be an oval œdematous mass involving a portion only of the bowel wall and projecting into the lumen, corresponding exactly with an enormously hypertrophied Peyer's patch. This mass projecting into the bowel will act as a foreign body and initiate the intussusception.

Mr. Forty's suggestion of acute enteritis as a cause of the lymphatic enlargement does not correspond with the clinical history in intussusception: the traditional bouncing boy is usually perfectly fit until the catastrophe, and Barrington-Ward in "The Abdominal Surgery of Children," says that "intussusception is more likely to occur in slightly constipated children than in the infant suffering from enteritis." Neither does it fit the post-mortem findings in acute enteritis of infants where enlargement of the mesenteric glands is not characteristic.

The statement that the age-periods of enteritis and intussusception coincide is not borne out by statistics. Acute enteritis, as shown in Dr. J. M. Smellie's article in your issue of April 29, is commonest in the second and third month while intussusception is rare before the fifth.

The lymphatic enlargement appears to be a chronic rather than an acute process, with perhaps increased engorgement due to dietary indiscretion as the determining factor. We still have no evidence of the true cause of the enlargement.

I am, Sir, yours faithfully,

Golders Green, N.W.11, May 2. D. OWEN DAVIES.

SIR,—Mr. Ian Fraser's experience of four intussusceptions in the same patient is almost as unusual as the fact that all the operations were performed by himself. I have myself operated on a patient who had three such operations, but I was only permitted to perform one of these. Mr. Fraser's case is an undoubted rarity; but the second part of his communication, which discusses the accompanying glandular enlargement and its causation, is in my opinion of even greater importance. Mr. Frank Forty has picked out this aspect of the problem for discussion. There is, however, still another question which may be considered. If the relationship between the glandular enlargement and the intussusception be that of cause and effect, by what mechanism is this effect produced?

In common with most surgeons attached to a children's hospital, I was early struck by the frequent association of enlarged lymph-glands at the ileocæcal angle with ileocæcal intussusception. The conclusion was soon forced on me that this was more than a mere coincidence; for some enlargement of these glands is invariably present, whilst in many cases the enlargement is extreme. In one case the mass resembled a tightly packed bunch of grapes, perhaps half a pound in weight. About the same time I also began to be impressed by the fact that enlargement of the lymph-glands in the mesentery of the small intestine can give rise to symptoms and signs sometimes indistinguishable from those of acute appendicitis.

With Mr. Forty's suggestion that the glandular condition in intussusception may be due to a simple acute enteritis I cannot agree. In my opinion this seems unlikely for the following reasons: (1) patients developing intussusception rarely if ever give a previous history of ill health; (2) a simple acute enteritis does not as a rule show gross enlargement of the lymph-glands; (3) when the abdomen is opened there is never any direct evidence of enteritis; (4) recovery after operation for a reasonably early ileocæcal intussusception is immediate and complete.

Let us consider the common history of a typical case of ileocæcal intussusception. In brief, an apparently healthy breast-fed child, about the end of its first year of life, is suddenly seized with acute colicky abdominal pain. The child has recently added artificial food to the mother's milk and the new food is, in part at least, composed of cow's milk. The latter is, I believe, the critical factor. The

symptoms of intussusception come on with dramatic suddenness without previous complaint of any kind. The diagnosis is usually clear because of the typical onset and the characteristic symptoms and signs, and operation discloses a unique pathology. May I state at once that I believe the glandular enlargement of these cases to be of tuberculous origin for the following reasons:—

1. Bovine tuberculosis is the commonest cause of gross glandular enlargement not in itself giving rise to symptoms.

2. Enlargement of lymphatic glands to the degree found can result from tuberculous infection within the period during which the child has been getting cow's milk. I base this on the fact that similar enlargement of glands of tuberculous origin takes place within this period in the neck, where the fact of the swelling and its progress are open to observation. In a case of my own the father kept a herd of tubercle-free cattle and the child was brought up wholly on tubercle-free milk. At the age of two he was taken to the seaside and was given ordinary milk. In six weeks' time he returned home with a large mass of glands in the neck in which tubercle bacilli were found in large numbers.

3. I have on several occasions found amongst the glands at the ileocæcal angle one which has shown definite caseation, though I must admit that on other occasions when the glands did not show obvious caseation and one was removed for examination the report received from the laboratory was "simple hyperplasia." This, however, does not exclude tubercle as a cause, for a similar report was received several times upon glands adjacent to those showing indisputable evidence of tuberculous origin.

4. Enlarged mesenteric lymph-glands situated in the mesentery and without obvious lesion in the intestine can give rise to colicky pain. The late H. W. Carson (1918), though not the first to call attention to this condition in England, contributed the first considerable article upon it, and attributed the pain to transient intussusceptions which resolve spontaneously. In his article he describes a case in which this actually occurred during the progress of an operation.

The sequence of events in intussusception I imagine to be as follows. The breast-fed child is as a rule reared on tubercle-free milk; it is therefore denied the opportunity of developing an immunity against tuberculous infection. On being given ordinary cow's milk it receives a grossly contaminated feed containing tubercle bacilli in such numbers that natural immunity is overcome, infection takes place and the defensive reaction of the glands is called into service. The glands, having become enlarged, interfere with the normal control of peristalsis by stimuli passing to the lower few inches of the ileum through the sympathetic and parasympathetic system. In this way, according to Carson's view, disordered contractions occur and intussusception follows. In a hasty search in the recent literature on the autonomic nerve-supply to the ileocæcal region I have not found a clear explanation of the exact mechanism by which this happens.

I am, Sir, yours faithfully,

Belfast, April 27. S. T. IRWIN.

ANEURYSM OF POPLITEAL ARTERY

SIR,—The paper by Mr. Cecil Flemming in your issue of Feb. 11 (p. 322) and the letter from Mr. Cameron MacLeod on Feb. 25 (p. 478) cause me to mention a case of my own in which resection of the segment of artery bearing the aneurysm, with preservation of the vein, led to a successful result without causing anxiety as to the circulation in the limb. A full account of my case has been accepted for publication by the *Australian and New Zealand Journal of Surgery*. It would be improper therefore to add more than these brief particulars.

The patient was a male Maori, 59 years of age, of magnificent physique. Nine years before he had a severe injury to both popliteal spaces through some sheets of iron, on which he was sitting in a cart, being driven forward and pinning his knees against the back of his horse. There had been severe circulatory disturbance at the time, again twelve months, and again three weeks before. The aneurysm was saccular, and the size of a hen's egg. There was a smaller one on the other leg. It had clearly formed through a partial rupture of the arterial wall, the media on section being curled up and down on either side of the gap leading to the sac. About 6 cm. of the artery was removed.

The only difficulties were tardy healing of the wound and venous thrombosis in the calf during convalescence. The final result was good.

I am, Sir, yours faithfully,

Auckland, N.Z., April 14. DOUGLAS ROBB.

TO WORRY OR TO FORGET?

SIR,—"Don't worry" is the advice frequently given by both medical men and laymen, together with the positive injunction "you must forget it," to sufferers from chronic diseases, such as tuberculosis of the lungs. Let us consider this way of forgetting.

Forgetting is a natural reaction of the mind to the unpleasant or painful. The importance of forgetting was borne in upon me in the following way. In October, 1936, a patient, recently returned home from sanatorium, came to see me. I asked him, "How are you spending your time?" He replied, "I sometimes sit and wonder how I can forget It." This impressed me; it seemed significant, and from that date I have been trying to discover how other patients react to the disease. Another man said, "You told me not to worry, and so I went into the sanatorium to forget It. I did things, like reading, but the topical budget was tuberculosis, and when you see others with hæmorrhages, you can't forget It." After five months he returned home "fed up." At home there was no mention of It. This startling statement stimulated me to continue this investigation. It seemed more than ever worth while to know what was the attitude of the patient to his or to her disease ("It," to use a short word)—in other words, how tuberculosis affects the mental life of the patient.

Some 25 or 30 cases have been studied. There appear to be three attitudes of mind or three phases of thinking and feeling. The first stage is worry or anxiety. It is associated with depression or resentment and irritability. The fact of tuberculosis seems to fill consciousness, and there may be questionings such as "Why should I have this? Why should I have to stop work and enjoying myself and go into hospital or sanatorium?" Some patients stick to this phase, but others move on. Friends say, "Don't worry"; doctors say, "Don't worry; do as you are advised."

Tuberculosis may be a medical problem in some cases and an economic problem in others, but it is always a mental problem in every case. To worry or to forget? That seems to be the question, and many decide in favour of the latter and agree, when advised not to worry, "I must forget It and take my mind off It." Forgetting is the withdrawal of the personality, just as the body withdraws from a painful impression, such as a pin-prick or a hot plate. There are various degrees of forgetting. In some cases the personality succeeds in repressing completely all

painful symptoms, and consciousness is filled with a phantasy of perfect health. This is the spes phthisica.

There was a patient, aged 12, in the children's sanatorium, an advanced case, bedridden, whose mother stated that, when the patient was in that state, she wrote home and said that she was quite well and playing with the other girls.

Another patient said, "I forget about anything. I don't want people to ask; some are so inquisitive. I walk along as though nothing is wrong—I'm fine, I'm a dandy. Then my breath goes, and I'm pulled up as with the crack of a whip." This patient died some three months after, much to my surprise, for, on physical grounds, there was no reason to expect such an early termination.

Another patient took his own discharge from sanatorium, for he was discontented. He had no complaints. He went off his sleep. "I'm not worrying, I'm making the best of it, but it is hard when you are dependent. I have never had to humble myself. I'm not sleeping; I thinks when I didn't oughter. In my mind I travel; I turn my thoughts to divert my mind from my health and condition of living." This was why he could not go off to sleep.

Another patient reported that he could not keep still. "He had to be doing things."

This restlessness of body and mind may be just an effort to forget and, in the intellectually gifted and artistic, may produce works of genius.

From this study I began to understand more clearly many of the difficulties arising from efforts to treat patients. For example:—

(1) Patients decline to go into a sanatorium but are willing to enter a chest hospital or the tuberculosis wards of a municipal general hospital because it is easier to forget that you have got It in the latter institutions.

(2) Patients don't settle in sanatorium because they can't forget It; let me quote another patient: "They were all miserable sinners—it was tuberculosis for breakfast, tuberculosis for dinner, and tuberculosis for tea. You could not forget It, whereas at home there is a conspiracy of silence."

(3) Sleep may be delayed for two to three hours, because in the day-time a patient can find things to do to take his mind off It, but when in bed he can't do things and has to think of what he has done or might do. Another patient said, "I used to be in bed and build things in my mind—huts and houses." On the other hand, there appear to be some patients who welcome sleep as a way of escape.

One can understand why patients fail to coöperate. The way of forgetting may lead to relapse. A girl said that "she just did the same as her sisters and went to the pictures." A man went to the public house.

Another male patient stated that he had had tuberculosis some years before and, after a period of sanatorium treatment, made a good recovery and remained well for ten years. He forgot that he had had tuberculosis; it never entered his head. He got a job in a motor factory and worked long hours, from 7.30 A.M. to 9 or 10 P.M. He had no proper meals. In 1937 he had a relapse. He says now that "he can't forget It," and that his wife is always saying to him, "It's dangerous when you cough; you scatter millions of germs." His wife said to me, "He is irritable; he never mentions It or talks of the sanatorium."

When we encourage the patients to forget, it is well to understand what may happen and to see the difficulties bestrewing the path. The way of forgetting may be pursued peacefully for a time, but at many points this progress may be upset. In the first place, there may be some symptom, a direct result of the disease and so a constant reminder of it: cough, sputum, pain, thinness of arms, shortness of breath, or staining. There are also visits to the doctor for the medical certificate and periodic examination at the dispensary. The neighbours avoid one or look at one in a certain way; acquaintances and work mates no longer visit. Members of the household may conspire to keep silent but, on the other hand, they may constantly remind the patient of It. The brothers and sisters go to work, return home in the evening, and on Fridays come home with their week's pay, but the patient stays at home and receives his or her sick pay, 6*s.* or 7*s.* 6*d.*—whatever it may be. One begins to understand the morbidness, the moodiness, the tears, the irritability, and the restlessness. To the patient, to worry and to forget seem to be the only alternatives. They are the Scylla and Charybdis of life.

Fortunately, there is a third way; perhaps it is a middle way. Out of the number of cases studied, only one patient seemed to have discovered it. He was notified as a case of tuberculosis of the lungs in 1931. When I saw him in 1936 he said, "I have found a philosophy. I have made tuberculosis a part of me; it is no use repressing." This seems to be the way of permanent recovery—to accept the fact of the presence of tuberculosis and all its consequences but to remember that there is a way of arresting the disease and, with perhaps some measure of disability, achieving health. Space will not permit of discussing the way in which a patient can be helped to discover this middle way.

Several questions arise in my mind. What is our attitude, as physicians, to It? Do we try to forget it in multiplying our surgical measures, radiographic examinations, and sedimentation tests? Do our methods of treatment, propaganda, or administration prolong the stage of worrying or forgetting? Why do some of the patients remain in the first or the second phase and so few discover the middle way? Here we touch on an important question: is there a morbid diathesis or a temperament that predisposes an individual to worry? I do not propose to endeavour to answer this question. The study of the mental effect of tuberculosis is well worth while. It is as important as studying the physical effect of the tubercle bacillus, whether by stethoscope, X rays, or microscope.

To sum up. In a small group of cases of tuberculosis of the lungs the mental attitude of the patients has been studied, and the following deductions have been drawn: (*a*) three ways of thinking about the disease have been observed—worrying, forgetting, and accepting; (*b*) all cases have passed from the first phase to the second, only one passed on to the third phase; (*c*) failure of coöperation may be one of the consequences of the phase of forgetting; and (*d*) the final phase of accepting the fact of the disease is the only satisfactory attitude.

I am, Sir, yours faithfully,

Balaam Street, E.13, April 22. P. A. GALPIN.

AIR-RAID CASUALTIES IN LONDON

SIR,—The general plan of the sectors for dealing with air-raid casualties in London has now been published for several weeks [1] and the details of the organisation of sectors are coming through to individual hospitals and staffs. You have also published [2] an article by L. Crome, R. E. W. Fisher and G. B. Shirlaw which outlined a short-term scheme differing

1. *Lancet*, March 25, 1939, p. 723.
2. *Ibid*, March 18, p. 655.

sharply from the organisation which is apparently being planned in the sectors. Your reviewer of "Medical Organisation and Surgical Practice in Air Raids" [3] pointed out a weakness in the scheme suggested by the authors of that book, in which it is stated that, while sorting of cases is neither possible nor desirable in the danger area, transport for the evacuation of casualties may be completely disorganised by a heavy bombardment. It is perhaps presumptuous to criticise the officers in charge of sectors who are having to plan a scheme for circumstances of which no-one in this country has any experience: but they have now completed their survey of the resources of personnel and medical buildings and equipment in each sector, and the differences of opinion persist as to the best utilisation of the resources of the sector.

In planning a military manœuvre, it is customary to precede the issue of special instructions by a general appreciation of the situation. The sector officers are working on the special instructions without the guidance of a general appreciation and it is about this point that the differences of opinion arise. If the scheme of Crome, Fisher and Shirlaw and that of Mitchiner and Cowell are compared, it will be seen that the latter proceed on the assumption that the problems of civilian air-raid casualties and of military casualties in moving warfare are the same, whereas the former regard the analogy as being incomplete: the "general appreciation" is quite different and therefore the "special idea" is necessarily quite different. An analysis of the differences may be helpful.

The military operations in France in 1914–18 were regarded as moving warfare. That they were in fact very stationary did not affect the organisation, which was set up on the assumption that a break through by one side or the other was possible, and so the casualty-clearing station (C.C.S.) was placed at some distance from the fighting line, the exact location of which might in theory vary to a considerable extent. An aerial bombardment of London is really comparable to siege warfare, and in siege warfare it is certain that until the beleaguered town falls or the siege is raised the fighting line will always be the same. It is therefore possible to give to the organisation behind the fighting line a more permanent form than can be achieved in moving warfare. It is common ground that any war wound should receive skilled surgical treatment at the earliest possible moment; and the C.C.S. is the first place where such treatment is available. In moving warfare the C.C.S. is of necessity some miles from the fighting line and the wounded suffer in consequence the tragedies of delayed treatment: in siege warfare the C.C.S. can be sited in buildings which can be fortified and the benefits of early wound treatment can be made available. There is of course in the latter case the risk that the C.C.S. may itself be hit in a bombardment, but it may be emphasised again that the inherent permanence of this type of war enables a considerably greater degree of protection to be provided for the C.C.S. than can ever be given to the C.C.S. of moving warfare, which must itself be prepared to pack up and move away.

It is certain that the delay in reaching the C.C.S. in moving warfare, inevitable as it is, is a bad thing; there is however a compensation. Because the fighting line may change and the C.C.S. shift, the line of evacuation of wounded does not necessarily remain unaltered: in the fixed siege type of war, the evacuating lines share the general immobility and vulnerability of everything else. Further, in moving war, the casualty knows that safety is to be found by getting away to the rear.

The analogy between an investing siege of London and successive aerial bombardments is not quite exact, because there is the hope that escape might be possible from the city in the latter case, and on that hope is based the stationing of surgeons at Epsom, Northwood, Watford and other towns outside London. It is worth noting that the fixed lines of evacuation will be under fire from enemy action and falling shell fragments, and the latter will be very large in number. The siege may for many hours be nearly complete: the casualties will be inside, the surgeon outside.

One additional point should be considered, about which there can be no deduction from past experience. Much stress is laid on the effect on morale of removing the casualty from the danger area. The fighting soldier knows that safety is to the rear: the civilian is used to medical treatment in the nearest hospital. It is at least arguable that the discovery that surgical treatment is not available for ten miles will have a depressing effect on morale.

The surgeons whose experience was gained in the war in France are accustomed to the idea of treating war casualties 8–24 hours after the infliction of the wound. Surely the circumstances of an air-raid demand the placing of the surgeons, adequately protected in buildings not necessarily designed as hospitals, nearer to their patients. It would be considered unwise to send a case of perforated duodenal ulcer from central London to Watford for treatment in peace-time with clear roads: to send the patient with perforation of the intestine after delay at a first-aid post on the same journey over roads or railways damaged by bombs under falling anti-aircraft shell must be wrong.

The wounded will be the sufferers from any medical breakdown: personal professional difficulties must not be allowed to have any importance. In the hope that the points raised in this letter may be considered on their, and not the writer's, merits, I ask to be allowed to sign myself,

Yours faithfully,

London, W.1, May 2. X.

3. *Ibid*, April 1, p. 763.

AN IMPROPER PARAGRAPH

WE have been requested by the *Sunday Pictorial* to publish an apology to Mr. J. Lyle Cameron and to the Royal Waterloo Hospital which appeared in its issue of April 30.

MR. LYLE CAMERON

AN APOLOGY

In last Sunday's *Sunday Pictorial* there was a reference to an action brought by a Miss Gladys Moore against Mr. Lyle Cameron, of Wimpole Street, the women's specialist, and against the Royal Waterloo Hospital. It was stated that Mr. Cameron and the hospital were being sued by Miss Moore for damages arising out of operations. It is recognised that this paragraph, which appeared by inadvertence, should never have been published, as the action against the hospital has, in fact, been struck out as disclosing no reasonable cause of action, and that against Mr. Cameron is being strenuously contested.

We accordingly desire to take the earliest opportunity of apologising unreservedly both to Mr. Cameron and to the Royal Waterloo Hospital, and expressing our sincere regret for any harm which may have been done to the reputation of Mr. Cameron or the hospital by this publication.

PARLIAMENTARY INTELLIGENCE

ON THE FLOOR OF THE HOUSE

By MEDICUS, M.P.

THIS last week in Parliament will stand out as that in which a British prime minister introduced conscription. It is an inevitable result of the many European commitments into which Great Britain has entered in order to ensure peace by the collective organisation of security. Although the adoption of conscription arises as part of a policy aiming at a united Europe, its immediately effective cause is a menace to the security of this continent closely parallel to the menace of Napoleon. History as always repeats itself; there are new names and newly phrased national ideals, as in Germany and Russia, but the realities of the political and economic interests of the nations are fundamentally the same now as in the past. Hence the alliances which Great Britain enters into, compelled by events. But there is a new factor. The organisation of the League of Nations remains and it is capable, when the nations are ready, of becoming the all-inclusive alliance in which the problems of a constructive peace can be solved around the conference table.

The sciences stand ready, with tremendous powers in their hands which a constructively thinking Europe can use to create great wealth and great prosperity. In agriculture, in medicine, in physics and chemistry, in engineering great powers are awaiting use. In this present period of the contest of power-politics those powers are limited because they can and must serve national ends. But not least significant of the facts that stand behind the immediate conflicts of politics at the present time are these great powers of the sciences and the realisation by doctors and other scientifically trained people of the meaning and significance of the social relations of science.

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The debate on the Civil Defence Bill opened the week on Monday. The bill has already passed its second reading and is being taken in committee of the whole House—that is on the floor of the chamber by all members instead of upstairs by a specially appointed committee of members. The effect of this is to secure greater freedom and publicity for the debates. The committee stage opened with an amendment in the name of Dr. Haden Guest, Labour M.P. for North Islington, to leave out certain words of the first clause dealing with the power of the Lord Privy Seal to delegate his powers to others. The object of this amendment was to clear up the considerable degree of confusion which has arisen as between A.R.P. duties under the Home Office, the Ministry of Transport, and the Ministry of Health. At present the M.O.H. of an area, whether it be a county, a city, or any smaller area, may get contradictory instructions from different departments. M.O.H.'s of metropolitan boroughs regard the confusion such as to make an efficient first-aid service impracticable in either war or peace. But the condition in the counties is also disturbing. Mr. Chuter Ede, Labour M.P. for South Shields, agreed that what had been said about London applied equally to counties and he spoke officially for the County Councils' Association. A grave point of difficulty is that stretcher-bearer parties are under the Home Office and first-aid posts under the Ministry of Health. The reason for this (as given by Sir John Anderson, speaking as Lord Privy Seal, designated for the work of counties defence by the Home Secretary—this is just to make it more difficult) is that the stretcher-bearer parties will be working in the street and must therefore keep closely in touch with other street parties, such as decontamination squads, breakdown parties, auxiliary fire services, and police. But it was felt that that was putting the cart before the horse. Stretcher-bearers in the street must naturally work closely with others—including, by the way, the ambulance service, which is either under the Ministry of Transport or Ministry of Health—but its work must dove-tail with and be part of the organisation of first-aid as a whole and therefore fit in with the first-aid posts. This is by no means a question of detail which may be settled equally satisfactorily in a number of ways. It is a question of primary importance because on the method of its settlement the efficiency of the casualty-clearing arrangements in time of air bombardment may depend. Sir John Anderson stuck to his point despite the criticism he received on both medical and local-government fronts; but he will have to give way eventually because the matter is one not of paper administration but of practical medical organisation and the M.O.H.'s of the county are more and more against this split-up of duties.

* * *

The week was also Budget week. On the Tuesday Sir John Simon opened his budget and it is an interesting footnote to remember that Sir John was a member of the Government in the Great War period and resigned from it because of his opposition to conscription. The budget this year dealt in many millions, and it disposed of sums of money on the services and civil defence greater than ever before in "peace" time—to the tune of about £2,000,000 a day. But its passage aroused less controversy than is usual. The money must be provided for defence and other services and that's all about it. What future generations will have to pay—well, if we do the best we can they must do the same in their day. In contrast to the conscription issue the budget was almost an "also ran."

Preoccupation with war and defence has not so far at least prevented matters of social interest claiming great attention. Pensions for spinsters at 55 have become a social issue of first-class importance and spinsters would seem to have a good claim to special consideration. A woman of 55 may be as good in the tables of vital statistics as a man, or better, but she is certainly not so good in the labour market. The demand for spinsters' pensions is part of the general demand for greater social protection for different sections of the community. This particular problem may have to be settled along with other pensions problems, but it is a real one and will have to be met.

Another activity of the week of special interest to Parliament was the nutrition conference of the B.M.A., presided over by Sir Arthur Salter, M.P., and addressed on family allowances by Mr. L. S. Amery, M.P., with many ministerial chevrons on his sleeve and a new campaign in front of him to improve the conditions of life of the least well-circumstanced of the population. To the distinction of the medical side of the B.M.A. conference I do not need to refer; its parliamentary political side is, however, of particular importance because it means that nutrition, linked up with general health problems and the

general agricultural problem, has become a first-class political issue. The admixture of medical science in the political mixture in these proportions will alter its effects very considerably. Add medicine to politics and you get not "the stock mixture as before" but a vitamin combining science and politics in a new way.

QUESTION TIME

WEDNESDAY, APRIL 26

Fracture Clinics

Sir ARNOLD WILSON asked the Minister of Health in what localities and under what auspices fracture clinics at present existed in Britain on the lines advocated in the interim report on the Rehabilitation of Injured Persons.—Mr. ELLIOT replied: I am informed that fracture clinics substantially on the lines advocated in this report have been established in the following localities:—

Geographical county	By local authorities	By voluntary hospitals	Total
ENGLAND			
Chester	—	4	4
Derby	—	1	1
Durham	—	2	2
Essex	1	4	5
Gloucester	—	4	4
Kent	—	2	2
Lancaster	3	14	17
Leicester	—	2	2
London	—	6	6
Middlesex	1	—	1
Soke of Peterborough	—	1	1
Northumberland	—	1	1
Nottingham	—	3	3
Somerset	—	1	1
Southampton	—	1	1
Isle of Wight	—	1	1
Stafford	—	4	4
East Suffolk	—	1	1
Sussex (East)	—	2	2
Warwick	—	2	2
Worcester	—	1	1
York (E. Riding)	—	2	2
„ (N. Riding)	—	2	2
„ (W. Riding)	—	7	7
WALES			
Glamorgan	2	—	2
Monmouth	—	1	1
SCOTLAND			
Lanark	—	1	1
Totals	7	70	77

Biological Research and Defence Camouflage

Mr. GRAHAM KERR asked the Chancellor of the Duchy of Lancaster whether, in view of the highly specialised biological knowledge necessary to secure full advantage from certain forms of war camouflage, he was prepared to set up an advisory body comparable with the camouflage subcommittee of the Committee of Imperial Defence, but including in its membership persons of recognised authority on the biological principles involved, which should be available to afford advice and guidance to those responsible for carrying out camouflage work in the four services—air, army, navy and civil defence.—Mr. W. S. MORRISON replied: There is already in existence a special section responsible for conducting investigations into the problems of camouflage, including the biological principles involved, and this section is in a position to obtain advice at any time from those whose special knowledge can contribute to the progress of those investigations. This is a research section supported jointly by the four services to which my hon. friend refers and it is available for consultation by those responsible for carrying out camouflage in those services.

Dating of Canned Foods

Mr. BULL asked the President of the Board of Trade whether, in view of the recommendations to the public to make, where possible, some slight provisioning of households with tinned or canned foods, he would consider legislation to ensure the marking on the tins or cans of the different dates when the contained articles were placed in the receptacles.—Mr. ELLIOT replied: The powers contained in the Food and Drugs Act, 1938, which comes into operation on Oct. 1 next, will be wide enough to enable me to require date marking on wrappers and containers. But, as at present advised, I am not satisfied that the advantages which might result from such a requirement would outweigh the administrative and technical difficulties involved.

THURSDAY, APRIL 27

Gas-masks in Hospitals

Mr. KIRBY asked the Lord Privy Seal what arrangements, apart from the general scheme of supply to individuals in their own homes, had been made to ensure an adequate supply of gas-masks in the hospitals and poor-law institutions of Liverpool for the use of patients and inmates during a period of emergency.—Sir JOHN ANDERSON replied: The numbers of persons in these institutions were included in the figures, supplied by the local authority, on which the issues of respirators have been based. The local authority therefore have sufficient respirators for the purposes mentioned in the question.

Mr. LYONS: Can the right hon. gentleman say whether that is the practice that has been pursued in every large city?—Sir J. ANDERSON: That is certainly the general practice.

Probationer Nurses and Examination Fees

Mr. BATEY asked the Minister of Health if he was aware that probationer nurses had to pay £2 each before they could sit for their preliminary examinations, and nearly £4 before they could sit for the final examinations; who received this money, and why it should be paid by probationer nurses.—Mr. ELLIOT replied: The fees payable are two guineas for the preliminary examination and three guineas for the final examination. They are paid to the General Nursing Council and are used to defray the cost of the examinations. As regards the last part of the question, the hon. member will be aware that it is usual for students to pay the fees for professional examinations such as these.

Mr. BATEY: Are these fees not rather heavy for young girls to have to pay simply to sit for an examination?—Mr. ELLIOT: I do not think that they are out of the ordinary for professional examinations.

The Factory Inspectorate

Mr. DAY asked the Home Secretary the total authorised strength of the factory inspectorate, men and women, for the 12 months ended the last convenient date; and if he could give particulars of the increase that had taken place in same during the last 12 months.—Sir SAMUEL HOARE replied: The total authorised strength of the factory inspectorate on March 31 last was 307. During the 12 months ended March 31 the inspectorate was increased by 26. The appointments included an additional deputy chief inspector, an additional superintending inspector, three medical inspectors, seven engineering inspectors, one electrical inspector and thirteen other inspectors.

Football Players and Gland Extract

Mr. LYONS asked the Minister of Health whether he was aware that gland extracts from animals were being administered to football players and particularly to the teams who were to take part in the 1939 cup final; and whether he would order an investigation into this practice with a view to ascertaining its effect and repercussions on national health.—Mr. ELLIOT replied: I have no first-hand information on this matter, but the gland extracts concerned are included in the medical pharmacopœia, and if, as I have reason to believe, they are administered under medical supervision, I do not think that any special investigation is necessary.

Mr. LYONS: Does the Ministry of Health endorse or approve of this form of treatment.—Mr. ELLIOT: Treatment administered under the supervision of a medical man is not a matter for approval or disapproval by my Department.

Mr. SHINWELL: Could not this gland treatment be administered to members of the Cabinet? (Laughter.)

Mr. MANDER: Is the right hon. gentleman aware that this treatment is entirely innocuous, that it has been widely administered with beneficial results as regards resistance to disease, and that the clubs concerned would welcome any inquiry that it is thought fit to make?

MONDAY, MAY 1

New Milk Legislation

Mr. PRICE asked the Minister of Agriculture whether it was his intention to take steps to deal, at an early date, with any of the problems of the production and sale of milk, either along the lines of the withdrawn Milk Industry Bill or along any other lines.—Sir REGINALD DORMAN-SMITH replied: I appreciate that existing legislative provision in regard to the milk industry expires on Sept. 30 next and I hope to introduce a further measure of milk legislation this summer. I am not yet in a position to indicate the lines that this may follow.

TUESDAY, MAY 2

The Duty on Patent Medicines

Lieut.-Commander FLETCHER asked the Chancellor of the Exchequer if he could give an assurance that the benefits of the abolition of the duty on patent medicines would be passed on to the public by reduction in the prices of the articles concerned; and that the concession would not be solely utilised to increase the profits of the proprietary medicine manufacturers.—Sir J. SIMON replied: In evidence before the select committee, which reported in 1937 on the Medicine Stamp Duties, one important body stated that if the duty were removed the consumer would receive the whole of the benefit and I rely on the goodwill of other manufacturers and vendors to follow this excellent example.

Commander FLETCHER: Is it not very desirable that the repeal of this archaic tax should not result in certain individuals making larger profits than they do at present out of deceiving and gulling the public?—Sir J. SIMON: I am not prepared to accept the suggestion that all remedies deserve epithets of that sort, but it is certainly desirable that, when a duty is abolished or reduced, as far as possible the benefit should be passed on to the public, just as is often the case when a tax is increased (see p. 1075).

Report of the Committee on Abortion

Mrs. TATE asked the Minister of Health if he could now give the date of the publication of the report of the Inter-departmental Committee on Abortion.—Mr. BERNAYS, parliamentary secretary to the Ministry of Health, replied: The report of the committee is now in the hands of the printers and it is expected that it will be published towards the end of this month.

MEDICAL NEWS

University of Cambridge

On April 29 the following degrees were conferred:—

M.D.—*A. C. E. Cole, *C. G. Pantin, W. H. G. Jessop, and E. J. M. Bowlby.
M. Chir.—D. L. Lewis and W. G. Gill.
M.B.—*John Hale and H. A. Hamilton.
* By proxy.

On Fridays May 5, 12, and 19 at 4.30 P.M. in the department of biochemistry Prof. Johannes Holtfreter of the University of Munich will lecture on problems of causal embryology.

University of London

At recent examinations the following candidates were successful:—

D.P.M.

With special knowledge of mental diseases.—F. R. C. Casson, R. W. Crocket, Gordon Diggle, J. J. M. Jacobs, Roderick Macdonald, William Telfer, and D. J. Watterson.
Part A.—D. W. Abse, W. E. Audley, Sophie Bookhalter, and J. D. Uytman.

Society of Apothecaries of London

At recent examinations the following candidates were successful:—

Surgery.—D. H. Dracup, R. S. Holtan J. A. L. Leeming, E. C. G. Miller, and J. A. V. Shone.
Medicine.—N. F. Bishay, D. Macpherson and F. D. P. Palmer.
Forensic Medicine.—D. Macpherson and F. D. P. Palmer.
Midwifery.—J. J. Brenner, D. Specter, and W. N. Vellacott.

The following candidates, having completed the final examination, are granted the diploma of the society entitling them to practise medicine, surgery and midwifery: J. A. L. Leeming (Oxfd and Guys), F. D. P. Palmer (Middlesex), and J. A. V. Shone (London Hosp.).

University of Wales

At recent examinations the following candidates were successful:—

D.P.H.

Part I.—H. L. Ackerman, James Paterson, Idwal Pugh, and R. W. Thomas.

Queen's University, Belfast

Applications for five Musgrave studentships, in pathology, biology, chemistry, physics and physiology, are invited. Each is worth £200 a year. They are open to British subjects who are graduates of at least one year's standing in a university of the British Empire. Applications should be sent to the secretary of the university by June 1.

Royal College of Physicians of London

At a meeting of the college on April 27 with Dr. Robert Hutchison, the president, in the chair, Prof. Harvey Cushing was elected an honorary fellow. Sir Charles Blackburn and Dr. S. V. Sewell, president and president-elect of the Royal Australasian College of Physicians, and Dr. N. G. Horner, editor of the *British Medical Journal*, were elected fellows under by-law XXXVIII (b). The following members were elected fellows:—

Hildred Carlill, M.D. Camb. (London); Walter Henry Grace, M.D. Lond. (Chester); Group-Captain Alan Filmer Rook (London); Isaac Jones, M.D. Melb. (London); Loswel Israel B. Braun, M.D. Lond. (Johannesburg); Frederick Martin Brice Allen, M.D. Belf. (Belfast); Louis Forman, M.D. Lond. (London); Ronald Epey Lane, M.B. Lond. (Manchester); Trevor Owen, M.B. Toronto (Toronto); Norman Bruce Williamson, M.D. Edin. (London); Eric Benjamin Strauss, D.M. Oxfd (London); Colonel Edward Selby Phipson, M.D. Lond. (Assam); Geoffrey Lawrence Samuel Konstam, M.D. Lond. (London); Ronald Edward Smith, M.B. Camb. (Rugby); Albert Victor Neale, M.D. Birm. (Birmingham); Hugh Gregory Garland, M.D. Leeds (Leeds); Cuthbert Leslie Cope, D.M. Oxfd (Oxford); John Callis Hawksley, M.D. Lond. (London); John Smith, M.D. Aberd. (Aberdeen); Hugh Crichton-Miller, M.D. Edin. (London); Rupert Samuel Bruce Pearson, D.M. Oxfd (London); Frank Patrick Lee Lander, M.D. Lond. (London); Richard White Bernard Ellis, M.D. Camb. (London); William Donald Wykeham Brooks, D.M. Oxfd (London); Janet Maria Vaughan, D.M. Oxfd (London); Robert Pierret, M.D. Lyon (Paris); William Allen Daley, M.D. Lond. (London); Naguib Mahfouz Pacha, M.B. Cairo (Cairo); Sir Henry Bashford, M.D. Lond. (London); William Fletcher Shaw, M.D. Manc. (Manchester); and Henry Francis Moore, M.D. Dubl. (Dublin).

The following were admitted members of the college:—

Alice Josephine Mary Taylor Barnes, M.B. Oxfd, Amiya Kumar Basu, M.B. Calcutta, Richard Maxwell Biggins, M.B. Melb., Manindralal Biswas, M.B. Calcutta, John Henderson Bolton, M.D. Melb., Josiah Mark Bonnin, M.B. Adelaide, James Eric Clarke, M.D. Melb., William Paton Cleland, M.B. Adelaide, William Richard Shaboe Doll, M.B. Lond., William Henry de Bargue Hubert, L.R.C.P., Ralph Kauntze, M.B. Camb., George Marcus Komrower, M.B. Manc., Eliot Digby Mackworth, M.B. Aberd., Ram Prakash Malhotra, M.B. Punjab, Emanuel Miller, L.R.C.P., Robert Mowbray, M.D. Durh., Frank Haddow Scadding, M.B. Lond., and John Dalrymple Willis, M.B. N.Z.

Licences to practise were conferred upon 220 candidates (204 men and 16 women) who have passed the final examination of the Conjoint Board and have complied with the by-laws of the college. The following are the names and medical schools of the successful candidates:—

Ghulam Ahmad, Lond.; A. C. Anderson, St. Bart.'s; S. C. Appleton, St. Thos.; G. N. Arthurs, Lond.; D. W. R. Ashby, Westminster; John Aspin, Camb. and Middlesex; Harold Auger, Lond.; D. M. Baker, Camb. and St. Thos.; G. C. Barron, Camb. and Middlesex; T. H. Bassett, St. Bart.'s; L. S. Beizer, St. Bart.'s; R. C. S. Benson, Lond.; W. C. Berriman, Manc.; E. B. Berry, Guy's; A. C. Bingold, Lond.;

F. T. Birkinshaw, Birm. and Univ. Coll.; P. H. Birks, Guy's; St. J. M. C. Birt, St. Thos.; M. R. Blair, Guy's; R. A. Blair, Lond.; P. J. Blaxland, St. Mary's; J. A. Bowen-Jones, Guy's; E. S. Brawn, St. Mary's; W. E. Bryan, St. Bart.'s; M. M. Bull, Camb. and St. Bart.'s; N. F. E. Burrows, Oxfd and Middlesex; J. R. Caldwell, St. Thos.; K. P. S. Caldwell, Camb. and St. Mary's; J. A. Campbell, Camb. and St. Thos.; John Carter, Lond.; P. J. R. Chalon, St. Mary's; J. H. O. Chance, Birm.; P. T. Chopping, St. Thos.; Nancy G. Clegg, Leeds; P. U. Colyer, St. Thos.; C. A. G. Cook, Guy's; Ewart Cook, Leeds; E. L. Corsi, St. Bart.'s; J. M. Couchman, Oxfd and St. Thos.; H. H. Crabb, Guy's; J. D. Craig, St. Mary's; J. V. Crawford, Lond.; G. R. Crawshaw, Manc.; J. J. Crehan, Sheff.; J. L. S. Cresswell, St. Mary's; A. P. Curtin, St. Bart.'s; D. O. Davies, Lond.; Dilys L. Davies, Cardiff; I. M. Davies, Cardiff; P. H. Davies, Manc.; R. M. Davies, Westminster; Nathan Dembovitz, St. Geo.; R. G. Denniss, Leeds; Raoul de Senneville, St. Bart.'s; H. E. de Wardener, St. Thos.; N. J. Dhondy, Bombay; Benjamin Djanogli, Guy's; William Donkin, St. Bart.'s; J. A. Duncan, Birm.; R. G. Eager, Oxfd and St. Thos.; F. H. Edwards, Westminster; W. G. C. Edwards, Middlesex; T. K. Elliott, St. Mary's; E. M. Elmhirst-Baxter, St. Bart.'s; J. F. Erskine, Charing Cross; R. H. Evans, Guy's; G. R. Fearnley, St. Thos.; C. M. Fletcher, Camb. and St. Bart.'s; Richard Fletcher, Camb. and St. Geo.; K. H. P. Flew, St. Thos.; Mita Frost, Roy. Free; J. W. Garraway, Middlesex; M. O. J. Gibson, Camb. and St. Thos.; J. C. Gillett, Oxfd and Middlesex; Barbara Girling, West Lond.; H. E. Gleave, St. Mary's; F. S. Gorrill, Charing Cross; L. B. Gunn, St. Thos.; J. T. A. Hackett, St. Bart.'s; R. H. V. Hafner, Univ. Coll.; Raymond Hanbury-Webber, St. Bart.'s; Jacob Harders, Lpool; E. Y. Haroun, St. Geo.; K. L. Hart, St. Thos.; M. F. Hart, Guy's; G. G. Hartill, St. Bart.'s; C. F. Hawkins, Guy's; F. A. Henley, Middlesex; Jack Herbert-Burns, Univ. Coll.; J. B. Heycock, St. Thos.; P. F. J. Hickinbotham, Birm.; A. C. S. Hobson, St. Mary's; T. P. Hopkins, Cardiff; W. J. T. Howard, Guy's; Consitt Huddlestone, Durh.; C. W. A. Hughes, Univ. Coll.; J. F. Hughes, St. Bart.'s; J. P. Irwin, St. Thos.; I. M. Jackson, Camb. and Lond.; Beryl C. James, Roy. Free; B. A. E. Johns, Birm.; Dorothy H. Johnston, Roy. Free; R. D. C. Johnstone, St. Thos.; A. K. Jones, St. Thos.; Eleanor M. Jones, Cardiff; W. A. Jones, Guy's; F. P. Kay, Royal Halifax Infirmary; R. M. Kennedy, Northwestern Univ. and West Lond.; J. B. Kershaw, Lond.; Robert Kershaw, St. Bart.'s; R. A. King, Lond.; M. H. Kinmonth, St. Thos.; W. H. Kirkcaldy-Willis, Camb. and Lond.; A. H. Knight, Guy's; Dorothy M. S. Knott, Roy. Free; D. B. Kulkarni, Bombay and Lond.; H. C. Lanchester, St. Thos.; David Lawrence, Univ. Coll.; Mary Laws, Univ. Coll.; Joyce Leach, Manc.; Geoffrey Levy, Westminster; J. S. Lillicrap, St. Bart.'s; J. J. H. Lowe, Durh.; J. N. Macdonald, Oxfd and Lond.; G. C. Mackay, St. Bart.'s; A. R. C. Margetts, King's Coll.; R. E. D. Markillie, St. Thos.; I. H. Marrable, St. Thos.; G. R. Marshall, Lpool; D. R. B. Mathias, Cardiff; Richard Mawson, Univ. Coll.; D. E. Meredith, Guy's; A. E. W. Miles, Charing Cross; M. D. Milne, Manc.; Shivaprasanna Misra, Calcutta; J. B. Mitchell, St. Mary's; Mary L. Mittell, Roy. Free; S. V. Mody, Bombay; N. C. Mond, Univ. Coll.; Margaret J. Morgan, Roy. Free; E. P. Morley, Camb. and Lond.; Donald Munro-Ashman, St. Mary's; John Murray, Middlesex; J. C. H. Nicolas, St. Bart.'s; Frederick Noronha, Bombay; Mary B. Oakden, Manc.; A. M. Ogilvie, Camb. and Lpool; S. P. S. Oswald, St. Thos.; Kenneth Page, St. Mary's; K. R. Pallot, St. Bart.'s; L. M. Pearce, St. Geo.; Sylvia Pearson, Birm.; W. H. Peek, Westminster; J. L. Penistan, Lond.; E. A. Penn, Charing Cross; J. H. Penrose, St. Thos.; P. E. Perceval, Camb. and Lond.; Freda M. Pescatore, King's Coll.; C. P. Petch, Camb. and St. Thos.; A. K. Pittman, Charing Cross; M. J. Pleydell, St. Bart.'s; Benny Pomerantz, Westminster; H. I. H. Porcher, Univ. Coll.; Felix Post, St. Bart.'s; F. L. Potter, St. Bart.'s; R. W. K. Purser, St. Thos.; P. R. Rainford, West Lond.; G. J. F. Rees, Guy's; I. B. Rees-Roberts, Univ. Coll.; B. W. Richards, St. Bart.'s; D. G. B. Richards, Birm.; J. R. E. Richardson, Guy's; Frances M. Roberts, Roy. Free; J. D. Rochford, St. Bart.'s; Nancy G. Rogers, Cardiff; Ernst Rosenbaum, Middlesex; W. H. S. St. John-Brooks, Camb. and St. Thos.; Mary Savory, Univ. Coll.; Sidney Shaw, Charing Cross; W. A. de C. Shearman, Guy's; M. A. Shellim, Guy's; V. S. Shuttleworth, St. Bart.'s; M. R. J. Snelling, St. Bart.'s; H. J. O. Speirs, King's Coll.; J. R. Squire, Camb. and Univ. Coll.; H. N. D. Stephens, St. Mary's; P. C. Steptoe, St. Geo.; A. M. Stevens, Camb. and Charing Cross; I. M. G. Stewart, Guy's; J. E. T. Strickland, Lond.; W. E. Swanston, St. Geo.; Geoffrey Tabuteau, Middlesex; J. A. Taylor, Sheff.; E. L. Tee, Lond.; J. E. Tees, Charing Cross; J. L. Temple, St. Bart.'s; A. S. Thenuwara, Cardiff; K. B. Thomas, Charing Cross; D. H. Thompson, Birm.; J. I. Timothy, Westminster; Boonchuay Tongbai, St. Bart.'s; E. H. Travers, Edin.; Dhavi Tumrasvin, Guy's; E. W. Turner, St. Bart.'s; L. H. Turner, Middlesex; R. S. Turner, Lond.; F. H. Tyrer, Camb. and Middlesex; H. G. Vyse, St. Thos.; L. D. Walker, Middlesex; R. J. S. Walker, Lpool; K. H. Walter, Guy's; Martin Ware, St. Bart.'s; C. K. Warrick, St. Bart.'s; Peter Watts, Univ. Coll.; J. W. S. Welbon, St. Mary's; R. G. S. Whitfield, Middlesex; H. W. Whittingham, Camb. and Middlesex; Richard Wilson, Camb. and St. Thos.; and P. B. Woodyatt, Middlesex.

Diplomas in anæsthetics were granted to the candidates named in our issue of April 22 in the report of the meeting of the Royal College of Surgeons.

Diplomas in tropical medicine and hygiene were also conferred jointly with the Royal College of Surgeons, upon the following candidates:—

A. C. E. Cole, W. G. Davidson, S. M. Desai, A. M. Dimyan, W. R. M. Drew, Adalberto Gomez, Munir Grais, H. P. Gunetilleka, A. J. Haddow, G. M. Hargreaves, J. K. Hunter, J. S. B. Kumarakulasinghe, J. H. McDonald, Sosa Matthew, S. K. Mufarrij, K. P. G. Nayar, H. B. Patil, E. P. Rigby, P. A. Shah, D. G. Snell, W. A. Thomas, S. C. Thurai-Rajah, C. M. Vanniasegaram, D. P. Viljoen, C. C. Warnesuriye, O. G. Weerasinghe, and S. C. Wright.

Prof. J. W. McNee was re-elected a representative of the college on the executive committee of the Imperial Cancer Research Fund and Dr. Reginald Hilton representative on the scientific advisory committee of the Radium Institute and Mount Vernon Hospital. Prof. W. W. D. Thomson was appointed a delegate to the 25th annual conference of the National Association for the Prevention of Tuberculosis at Belfast (June 29 to July 1).

Scottish Conjoint Board

The following candidates having passed the final examination of the board were on April 29 admitted licentiates of the Royal Colleges of Physicians and Surgeons of Edinburgh, and of the Royal Faculty of Physicians and Surgeons of Glasgow:—

William Anderson, G. L. Basak, S. S. Basta, C. H. Boyd, William Briggs, A. A. Brown, Caroline M. Brown, Gertrude M. Brown, Hyman Chartock, C. N. Dhlamini, F. L. Fung, W. F. H. Gibson, L. N. Gitzelter, Phoebe T. Goggin, Nathan Goodman, M. F. H. Griffith, E. J. Guller, H. L. Hart, Murugesu Kandasamy, Marcus Langman, F. G. Lassalle, John Loudon, R. W. McClements, G. W. R. MacGregor, Mary P. Maclean, G. R. P. MacLeish, S. S. Molema, John Morkan, S. G. Paletz, J. A. Perpoli, P. A. M. Robertson, W. S. Schram, Simeon Siegel, H. S. V. Smith, Ali Tawfic, Abraham Unger, and B. N. Young.

The following graduates of recognised universities having passed the final examination were also admitted licentiates of the colleges and the faculty:—

Paul Baer, S. F. Berndt, Wolf Elkan, Rudolf Freudenberg, Gerda Friedmann, A. A. Malik, Willie Mayer-Gross, and R. P. M. Regnault.

Hospitals Day

The voluntary hospitals of London are holding their Hospitals Day this year on May 9 in inner London and on May 13 in outer London. An anonymous donor has offered to add sixpence to every shilling collected in the streets. On May 8 Lord Luke, chairman of Hospitals Day, will open a hospitals exhibition at Charing Cross underground railway station. Offers of help should be made to Lord Luke at 36, Kingsway, W.C.2.

Charterhouse Rheumatism Clinic

A medical meeting will be held at this clinic, 56, Weymouth Street, London, W.1, at 8.30 P.M., on Wednesday, May 17, when Mr. J. S. Ryan and Dr. Raymond Greene will speak on the endocrine aspect of rheumatism. Dr. H. Warren Crowe will show a film demonstrating postural exercises, and Dr. S. Gilbert Scott a film on spondylitis. Members of the medical profession are invited to attend.

Medical Sickness, Annuity and Life Assurance Society

At the annual general meeting of this society, held at its offices, 300, High Holborn, London, W.C.1, on April 25, Dr. F. C. Martley, chairman of directors, presented the annual report. The past year, he said, had been exceptionally difficult, but progress could nevertheless be recorded on every side of the society's work. The premium incomes of the life-assurance and sickness funds were now £134,120 and £123,508 respectively, the latter showing a record increase during the year. The amount paid in benefit in the sickness fund had dropped from £61,222 to £59,627, chiefly because there was no universal epidemic of influenza. The total funds of the society had increased by £203,344 and now stood at £1,790,000. As regards investments a steady flow of money was being invested in practices and houses, and a stage had been reached at which substantial sums were being annually repaid.

After the directors' report and balance sheet had been adopted, the two retiring directors, Dr. de Bec Turtle and Mr. Lancelot Bromley, F.R.C.S., were re-elected, and to fill the vacancy caused by the death of Mr. W. H. Dolamore, Mr. C. P. G. Wakeley, F.R.C.S., who had already been coöpted by the board, was elected. Approval was given to a recommendation for the payment of an interim bonus on all with-profit policies for permanent sickness and accident insurance and life assurances becoming claims during the year ending Dec. 31, 1939.

Mr. Arthur Miller, honorary surgeon in charge of the ear, nose and throat department of the French Hospital in London, has been elected a corresponding member of the French Society of Otolaryngology.

Kensington Medical Society

Lord Horder's address to this society, which was to have taken place on May 10, has now been postponed to June 14. Lord Horder will speak on the mental aspects of physical disease.

Guy's Hospital

On Monday, May 8, at 5 P.M., Dr. W. Randolph Lovelace of the Mayo Clinic will give a lecture in the medical school of this hospital. He will speak on the use of high concentrations of oxygen and of helium and oxygen mixtures.

Royal Society of Arts

On May 8, 15, and 22, Prof. E. C. Dodds will deliver three Cantor lectures to this society. He will speak on modern chemistry, modern medicine, and modern food. The lectures will be held at 8 P.M. in the house of the society, John Street, Adelphi, London, W.C.2.

Research in Encephalitis

The foundation of the advancement of encephalitis research, at the University of Berne, offers prizes to workers in that field. Particulars will be found in our advertisement columns.

London (R.F.H.) School of Medicine for Women

It is announced that a royal charter was granted to this school on Dec. 9, 1938. The school was founded in 1874, and in 1898 was registered as an association incorporated under the Companies Acts.

Road Accidents in Ireland

An official return of the road accidents in the area under the control of the government of Ireland in the year 1938 has recently been issued. There were 221 persons killed and 5558 injured. With the exception of the year 1933 the total number of persons killed or injured has for many years shown an upward tendency. Of pedestrians 90 were killed and 1881 injured. Of pedal cyclists 80 were killed and 1778 injured. In the opinion of the police, on whose reports the return is based, 13·8 of the accidents were due to pedal cyclists, 11·7 to pedestrians, and 51·3 per cent. to vehicle drivers. The chief causes of motor accidents were: excessive speed, 965, of which 33 were fatal; failing to keep the right side of the road, 660, of which 17 were fatal; improperly overtaking, cutting-out, &c., 751, of which 7 were fatal; coming from one road into another carelessly, 1191, of which 4 were fatal. The influence of alcohol was considered responsible in 101 accidents, of which 3 were fatal. While the figures for 1938 showed an increase of 12 fatally injured and 1311 injured over the figures for 1937, there was an increase of 4635 motor vehicles on the roads from the earlier year to the later.

Scottish Association for Mental Hygiene

The Scottish Association for Mental Welfare was formed in 1922 at the request of the General Board of Control for Scotland as a voluntary body to supervise the welfare of defectives not in institutions through care committees, committees for home visitation and employment centres throughout the country. In 1929 this work, which was confined to dealing with defectives, was extended to deal with mental hygiene in the non-defective community as part of a world-wide mental hygiene campaign originated in the United States. The aims of this section were directed chiefly to propaganda in order to increase public awareness of the problems of neuroses and early psychoses and to foster the utilisation of psychiatric clinics throughout the country. In 1934 the Scottish Child Guidance Council was formed as a separate body and in May, 1938, these two bodies amalgamated to form the Scottish Association for Mental Hygiene which now represents the unification of activities directed towards mental defect, mental hygiene, and child guidance. Local authorities, medical, educational, and social bodies are represented on the association, and any interested person may also join. Further information may be had from the secretary, 23 Eglinton Crescent, Edinburgh.

Air-Commodore William Tyrrell and Air-Commodore A. S. Glynn have been appointed honorary surgeons to the King; and Group-Captain G. S. Marshall and Group-Captain H. L. Burton honorary physicians to the King.

Patent Medicines and the Budget

At a council meeting of the Pharmaceutical Society of Great Britain on Wednesday last the president said that the Government's proposed removal of the Medicine Stamp Duty and Patent Medicine Licence Duty would encourage abuses that Parliament intended to discourage when it imposed a vendor's tax 150 years ago. "I cannot believe," he said, "that the Government would desire to remove every vestige of restriction upon the sale of self-prescribed medicines at present subject to the acts." The effect of repeal of the duty would be to encourage a return to secret remedies, to promote the use of medicines far beyond the needs of the community, and to divert to the untrained and unqualified vendor a greater proportion of the handling of drugs.

Congress for Life Saving

The fifth International Congress for Life Saving and First Aid to the Injured will be held at Zürich and St. Moritz from July 23 to 28. The chairman of the British committee is Mr. Thomas Stowell, F.R.C.S., and the secretary, Mr. G. L. Perry, may be addressed at 14, Hobart Place, London, S.W.1.

National Fitness Council for England and Wales

At a meeting of this council held on May 2 at the Ministry of Health, Whitehall, Lord Dawson said that the subcommittee set up to determine the criteria of fitness had agreed upon the following definition for the purposes of the National Fitness Council: "Fitness is a state of physical, mental and spiritual wellbeing in which the individual can perform and enjoy the activities of his leisure and working hours."

Royal Faculty of Physicians and Surgeons of Glasgow

At a meeting of the faculty on May 1 Prof. T. K. Monro was admitted to the honorary fellowship. In introducing the new fellow, Dr. John Henderson, the president, said: "Dr. Monro is well known to you all as a physician and teacher of distinction, a wise councillor and an ex-president of this faculty, a medical historian, and an author whose work has not entirely been confined to the field of medicine. He has already been honoured by his own university who conferred on him the honorary degree of LL.D."

Devon and Exeter Cancer Fund

At the annual meeting of the trustees of this fund Dr. Charles Wroth, the medical officer, stated that the amount and type of work carried out in the past year in the radiation treatment of malignant disease was practically identical with that of the preceding two or three years, and it seemed unlikely, for the present, that any important change would take place in this aspect of attack. Minor variations in technique might improve results, but it seemed that standardisation of the accepted methods was taking place, and that a more accurate knowledge of those conditions likely to benefit from radiation methods was being gained.

Radiesthesia

Dr. Ernest W. Martin and Dr. W. Guyon Richards inform us that a Medical Society for the Study of Radiesthesia has been founded and will meet in London at 8.30 P.M. every third Thursday in each month. "We desire," they say, "to study not only radiation from the human body, but electrical conditions generally—the action of mind on mind and allied phenomena." After referring to the use of measuring apparatus, including "those developed from Abrams's discoveries, Boyd's emanometer, divining rod and pendulum," they state that the membership is confined to qualified medical men, though physicists and others will be asked to attend as guests. Particulars may be had from Dr. Richards at 12, Park Crescent, W.1, where the meetings will for the present be held.

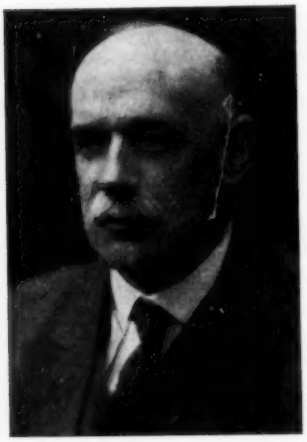
OBITUARY

ROBERT ALFRED BOLAM

KT., O.B.E., M.D. DURH., LL.D., F.R.C.P.

Sir Robert Bolam died at his home at Newcastle-on-Tyne on April 28 at the age of 67. His death is the greater blow to his friends that it was unexpected; his energy had seemed so little subject to physical limitations. Natural ability combined with tenacity of purpose and business acumen brought him success at every stage of a career which included the vice-chancellorship of Durham University, the chairmanship of council of the British Medical Association, and the chair of business at the General Medical Council.

Robert Alfred Bolam was born in 1871, the son of John Bolam, a Newcastle chemist, and was educated at Rutherford College, graduating at the University of Durham medical school in 1896 with the gold medal in medicine. He then worked with W. D. Halliburton at King's College, London, returning to Newcastle to demonstrate practical physiology and pathology, becoming joint lecturer with Sir Thomas Oliver at the college of medicine, and ultimately succeeding him as its president. His scientific equipment served him in good stead in the self-imposed task of reorganising the college museum, in which he was assisted by G. G. Turner, using for the first time the Kaiserling method. He soon became assistant physician to the Royal Infirmary and in 1907 succeeded James Limont as physician to the skin department. During the late war he was in command of the Wingrove Hospital, which was the venereal-disease department of the 1st Northern General Hospital, and when this clinic was merged with the skin department of the infirmary he took charge of both until his retirement in 1931. Not content with lecturing on physiology, pathology and then dermatology he was also lecturer on medical jurisprudence and held the chair at the school in that faculty. In 1927 he followed R. Howden as registrar of the college of medicine, becoming president of the college in 1934. On the academic side he was senator and pro-vice-chancellor in 1935 and vice-chancellor in 1936–37. But this did not prevent him from acting as chairman to a departmental committee on the training of midwives or as a governor of the British Postgraduate Medical School.



[*Walter Scott*

This bare outline of Bolam's career in his home town needs something to be added of the personal impression he made there. In the course of an intimate letter Sir Thomas Oliver writes: "As the oldest member of the college of medicine and one who had known Robert Bolam from his boyhood, I can express not only my own sense of personal deprivation but of the great loss his comparatively early death is to medicine generally and to this school in particular. He was a remarkable technician, had good expository gifts and was an adept chemist, so that when I was carrying out experiments on occupational maladies and particularly an inquiry into the cause of death in electric shock he proved himself a most capable and suggestive co-adjutor. Later he became an outstanding man in any assembly; he made an excellent chairman, for he had a wide knowledge of procedure. He was slow to speak until he had listened to the opinions of others, but when he had anything to say he had the courage of his convictions as well as the ability to express and sustain them. During the building of the old college in Northumberland Road his knowledge of the requirements of physiological laboratories and class-rooms for the various departments rendered great assistance to the architects and it was his friendship with Sir Arthur Sutherland that led to the gift of £100,000 which provided our new school. Honour after honour kept pouring in upon him, and although some of them demanded personal service in return he never deviated from the path of rectitude in regard to all his commitments; but the work was arduous and gradually told upon him. Despite increasing myocardial weakness he was able to discharge with his usual brilliance and courtesy the duties incidental to the royal visit on Feb. 26. The end came from sudden cardiac failure. His is a record of a life fully lived, and of work well done."

It was in his early forties that Bolam became associated with the central administration of the British Medical Association. He became a member of the representative body in 1913 and a member of the council in 1915. Five years later, during the annual meeting at Cambridge, he was elected chairman of council in succession to J. A. Macdonald. It was a matter of astonishment to Londoners that he was able to combine active practice in Newcastle with unwearying attention to the duties of this chairmanship. Mr. Bishop Harman writes: "I have served with Bolam on many councils and committees, and I do not think there has ever been any man with whom I have come in close contact whose personality has been more human, more influential, and more effective than his. There is still in my mind a vivid impression of my first knowledge of him. It was at a meeting of the representative body of the British Medical Association. There were under consideration the proposals of the Government for the organisation of the treatment of venereal diseases. One of the items of those proposals was a provision that '606,' or its equivalent, should be supplied free of charge to all registered medical practitioners who could give evidence of their competency to administer it. There was a vehement repudiation from speaker after speaker of the qualification attached to the provision. Every registered medical practitioner, it was asserted, was competent to do necessary medical work, and the qualification was an infringement of the statutory powers of the General Medical Council and the Medical Acts. The trend of the debate was such that it appeared to be certain that the offer of the Government would be rejected. Then Bolam got up. I think there were few who knew him then. But they knew him well in the course of the next few minutes. In the simplest of terms he gave the meeting a clinical lecture on his personal experiences of the difficulties and dangers of the administration of this treatment, which at that time was relatively new. It was the shortest

and the most effective clinical lecture I have ever heard. Its effectiveness was demonstrated by the immediate acceptance by the meeting of the proposals of the Government including the qualifying clause. In all his speaking he showed the same gentle yet convincing persuasiveness. He spoke to his audience as man to man. There was no rhetoric of declamation or artificial eloquence in his words or manner, but the true rhetoric of effective speech. There was no-one who listened to him who was not certain of his complete sincerity, and his words were correspondingly weighty.

"With his work for the British Medical Association I was closely associated, and I can bear personal testimony to its great value. It was at the first normal annual meeting after the end of the Great War that he was elected chairman of the central council, and for seven years, during the heavy work of reconstruction, he gave the fullest service to the association. The demand made upon his time by attendances at meetings in London was such that I often thought he slept more often in the railway train than at his home. Besides his power for work and the acuteness of his judgment, he had the gift and the manners of a dignified courtier. It was a real pleasure to witness the naturalness and orderliness with which he received King George V and Queen Mary when they opened the new B.M.A. House in Tavistock Square; and when on the same day he received the Archbishop of Canterbury for the dedication of the great gates to the court of honour.

"Finally, I would like to give my personal testimony to the services he rendered to the General Medical Council. The fact that he, a north country consultant and specialist, was elected by the great bulk of the profession who are naturally in general practice is in itself eloquent testimony to the impression he made upon his colleagues. As chairman of business he held an office that entailed delicate decisions the difficulty of which only members of the council could assess. There were many who felt that the time might come when he would be called upon to undertake still more responsible work for the council.

"Members of his family often accompanied him to annual meetings of the association, and our sympathies go out to Lady Bolam, his son Dr. R. Mason Bolam, and his two daughters."

The President of the General Medical Council writes: "Sir Robert's death is a heavy blow to the council, of which he had been a member since 1920, first as a direct representative, and since 1928 as representative of the University of Durham. Since 1932 he had been elected year by year to be chairman of business, and I do not think any president ever had a more efficient aide-de-camp. He served at one time or another on almost all the committees of the council, and left the mark of his business-like mind on each of them."

NORMAN JAMES MACDONALD

B.A. CAMB., M.R.C.S.

Dr. Macdonald, who died in London on April 24 at the age of 44, was the only son of the late Mr. C. J. B. Macdonald, for many years agricultural correspondent of the *Times*. He was educated at Pembroke College, Cambridge, and St. Bartholomew's Hospital, where his study was interrupted by service as surgeon sub-lieutenant in the Royal Naval Volunteer Reserve. Qualifying in 1919 he became ophthalmic house-surgeon at the hospital and later house-surgeon to Mr. L. Bathe Rawling. Even then his physique was not good, and Mr. Rawling recalls the courage and determination which overcame his disabilities. Although possessing decided opinions and quite fearless in their expression he was popular with his colleagues, who found him conscientious in his work, kind and considerate to his patients and courteous to everyone. When his hospital appointments were finished he went to the American School of Osteopathy at Kirksville, Missouri, and qualified there as a doctor of osteopathy, and it was largely on osteopathic lines that he had practised in London for the past fifteen years, making occasional contributions to the medical press on the influence of spinal manipulation and adjustment. A few years ago his name came before the public through his criticism of the telephone service, which had failed to respond at night to an urgent call to notify a fire in Wimpole Street, and his action at this time was followed by the introduction of the new emergency call of 999.

Dr. Macdonald leaves a widow.

Medical Diary

May 8 to May 14

SOCIETIES

ROYAL SOCIETY OF MEDICINE, 1, Wimpole Street, W.1.

TUESDAY.

Therapeutics and Pharmacology. 4.30 P.M., general meeting. Mr. C. Rimington, Ph.D.: Porphyrins and Their Relation to the Metabolism of Blood Pigments. Mr. G. Brownlee: Porphyrin Excretion Following Antipyretics. Dr. N. Hamilton Fairley: Methæmalbumin.

Psychiatry. 8.30 P.M., annual general meeting. Dr. W. Russell Brain, Dr. H. V. Dicks, and Dr. E. A. Carver: Medicine and the Law in Relation to Drug-addiction.

WEDNESDAY.

Proctology. 8.30 P.M., Mr. J. P. Lockhart-Mummery: Hæmorrhagic Purpura Complicating Excision of the Rectum. Dr. Cuthbert Dukes: Ossification in Rectal Cancer. Mr. Harold Edwards: Diverticula of the Small and Large Intestine. Mr. E. G. Muir: Abdominal Resection for Rectal Carcinoma. Mr. Maurice Lee: Treatment of Partial Prolapse of the Rectum by Perirectal Injections of Sylnasol. Mr. W. C. Barber: Perianal Ulceration of Unknown Ætiology.

FRIDAY.

Clinical. 5.30 P.M., annual general meeting.

MEDICAL SOCIETY OF LONDON, 11, Chandos Street, W.1.

MONDAY.—8 P.M., annual general meeting. 8.30 P.M., Prof. J. A. Ryle: Clinical Sense and Clinical Science (annual oration).

HARVEIAN SOCIETY OF LONDON.

THURSDAY.—8.30 P.M. (26, Portland Place, W.1), Mr. L. R. Broster: Recent Advances in the Surgery of Adrenal Cortex.

HUNTERIAN SOCIETY.

MONDAY.—8.30 P.M. (Simpson's Restaurant, Bird-in-Hand Court, Cheapside, E.C.2), annual general meeting. Mr. C. Ainsworth Mitchell, D.Sc.: Identifications in Criminology.

MEDICAL SOCIETY OF INDIVIDUAL PSYCHOLOGY.

THURSDAY.—8.30 P.M. (11, Chandos Street, W.1), Dr. Desmond Curran: Escape into Drugs and Alcoholism.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

ROYAL SOCIETY OF ARTS, John Street, Adelphi, W.C.2.

MONDAY.—8 P.M., Prof. E. C. Dodds: Modern Chemistry, Modern Medicine, and Modern Food. (First Cantor lecture.)

TAVISTOCK CLINIC, Malet Place, W.C.1.

MONDAY.—6 P.M., Dr. Emanuel Miller: Theories of Instinct (I).
WEDNESDAY.—3 P.M., Dr. Cedric Shaw: Hyperthyroidism. 4.30 P.M., Dr. H. Crichton-Miller: Anxiety.
THURSDAY.—6 P.M., Dr. Laura Hutton: Adolescence.

INSTITUTE OF PSYCHO-ANALYSIS, 96, Gloucester Place, W.1.

TUESDAY.—8.30 P.M., Mr. R. Money-Kyrle: Varieties of Group Formations.

GUY'S HOSPITAL, S.E.1.

MONDAY.—5 P.M., Dr. W. Randolph Lovelace (Mayo Clinic): The Use of High Concentrations of Oxygen and of Helium and Oxygen Mixtures.

ST. MARY'S HOSPITAL, W.2.

TUESDAY.—5 P.M. (institute of pathology and research), Dr. V. D. Allison: The Mode of Spread of Acute Streptococcal Infections.

WESTMINSTER HOSPITAL, Horseferry Road, S.W.1.

TUESDAY.—5 P.M., Dr. W. E. Lloyd: Lymphosarcoma. Mr. F. C. Ormerod: Carcinoma of the Larynx.

BRITISH POSTGRADUATE MEDICAL SCHOOL, Ducane Road, W.12.
TUESDAY.—4.30 P.M., Dr. C. M. Hinds Howell: Syphilis of the Nervous System.
WEDNESDAY.—Noon, clinical and pathological conference (medical). 2 P.M., Dr. T. C. Stamp: The Bacteriology of Acute Respiratory Infections—Pneumonia and Whooping-cough. 3 P.M., clinical and pathological conference (surgical). 4.30 P.M., Prof. J. McIntosh: Cancer.
THURSDAY.—2.15 P.M., Dr. Duncan White: radiological demonstration. 3.30 P.M., Mr. Wilfred Shaw: Neoplasms of the Ovary, including Endometriosis.
FRIDAY.—2 P.M., clinical and pathological conference (obstetrics and gynæcology). 2.30 P.M., Mr. Cecil Joll: Toxic Goitre.
Daily, 10 A.M. to 4 P.M., medical clinics, surgical clinics and operations, obstetrical and gynæcological clinics and operations.

HOSPITAL FOR SICK CHILDREN, Great Ormond Street, W.C.1.
THURSDAY.—2 P.M., Dr. M. Hynes: Ætiology of Gastro-enteritis. 3 P.M., Mr. Charles Donald: Surgical Tuberculosis in Childhood.
Outpatient clinics daily at 10 A.M. and ward visits at 2 P.M.

LONDON SCHOOL OF DERMATOLOGY, 5, Lisle Street, W.C.2.
MONDAY.—5 P.M., Dr. W. N. Goldsmith: Acneiform Eruptions.
TUESDAY.—5 P.M., Dr. Mitchell Heggs: Skin Affections of the Hands and Feet.
THURSDAY.—5 P.M., Dr. W. Griffith: Bullous Eruptions.
FRIDAY.—5 P.M., Dr. G. Duckworth: Psoriasis.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION, 1, Wimpole Street, W.1.
MONDAY to SUNDAY.—ST. PETER'S HOSPITAL, Henrietta Street, W.C.2, all-day course in urology.—ST. JOHN'S HOSPITAL, 5, Lisle Street, W.C.2, afternoon course in dermatology. (Open to non-members.)—MAUDSLEY HOSPITAL, Denmark Hill, S.E.5, afternoon course in psychological medicine.—BROMPTON HOSPITAL, S.W.3, Tues. and Fri., 5.15 P.M., M.R.C.P. course in chest diseases.—INFANTS HOSPITAL, Vincent Square, S.W.1, Sat. and Sun. course in children's diseases.

MANCHESTER ROYAL INFIRMARY.
FRIDAY.—4.15 P.M., Dr. P. B. Mumford: demonstration of skin cases.

HONYMAN-GILLESPIE LECTURE, EDINBURGH.
THURSDAY.—4.30 P.M. (Royal Infirmary), Mr. J. J. M. Shaw: Cancer of the Mouth and Jaws.

Appointments

BOND, S. A., M.B. Glasg., assistant resident medical officer, attached to the obstetrical, gynæcological and surgical unit at Park Hospital, Davyhulme, Manchester.
COVENEY, MARGARET F., M.B. Sheff., D.P.H., assistant medical officer of health for Edmonton.
ELLIOTT, R. W., M.B. Sheff., resident medical officer at the Leicester City Isolation Hospital and Sanatorium.
GHEY, P. H. R., M.Chir. Camb., F.R.C.S., hon. surgeon to Addenbrooke's Hospital, Cambridge.
LANGLEY, G. F., Ch.M. Brist., F.R.C.S., medical superintendent at the Borough General Hospital, Ipswich.
REES, E. L., L.R.C.P.E., assistant medical officer at Wonford House Hospital, Exeter.
REYNOLDS, S. J. R., M.B. Camb., D.M.R.E., hon. assistant radiologist to the Prince of Wales's General Hospital, London.
ROBERTS, C. T., M.B. Leeds, junior resident medical officer at Park Hospital, Davyhulme, Manchester.
ROBERTS, LOUIS, M.B. Leeds, assistant medical officer at Wakefield Mental Hospital.
ROSS-KEYT, F. D., M.B. Aberd., D.P.H., medical officer of health for Thornaby-on-Tees and the rural district of Stokesley, and assistant to the medical officer of health for the North Riding of Yorkshire.
Examining Surgeons under the Factories Act, 1937: Dr. J. B. YOUNG (Garforth District, York, W.R.); Dr. J. W. JAGO (Hathersage District, Derby); Dr. R. OKELL (Winsford District, Chester).

Vacancies

For further information refer to the advertisement columns

Aberdeen University.—A. W. Garden fellowships, each £200.
Acton Borough.—M.O.H. and school M.O., £1000.
*Albert Dock Hosp., E.*16.—Asst. surgeon in general surgery.
Ashton-under-Lyne, Lake Hosp. and Darnton House Institution.—Jun. res. M.O., at rate of £225.
Barnes Borough.—Asst. M.O.H., £500.
*Battersea General Hosp., Battersea Park, S.W.*11.—Cas. O., at rate of £60.
Belfast, Ministry of Home Affairs for Northern Ireland.—Medical inspector, £750.
Belfast, Royal Victoria Hosp.—Orthopædic registrar.
Birmingham and Midland Eye Hosp.—Res. surg. O., £200.
Birmingham Royal Cripples Hosp.—Res. H.S., at rate of £200.
*British Postgraduate Medical School, Ducane Road, W.*12.—Assistantship in morbid anatomy and assistantship in clinical pathology, each £300.
Burnley County Borough.—Asst. M.O.H., £600.
Cardiff, King Edward VII Welsh National Memorial Association. Asst. res. M.O. for North Wales Sanatorium, £200.
Chesterfield and North Derbyshire Royal Hosp.—H.S. to ophthalmic and ear, nose, and throat dept., at rate of £150.
Colchester, Royal Eastern Counties' Institution, &c.—Asst. M.O., £400.
Colonial Medical Service.—M.O.'s.
Derby, Derbyshire Royal Infirmary.—H.S. for general surgery, £150.
Dudley, Guest Hosp.—H.S., £150.
Halifax Royal Infirmary.—First H.S., at rate of £200.
*Hampstead General Hosp., Haverstock Hill, N.W.*3.—Res. cas. surg. O. for outpatient dept., at rate of £100.
Hertford County Hosp.—Hon. consulting physio-therapeutist to dept. of physical medicine. Also H.S., at rate of £200.
*Hosp. for Sick Children, Great Ormond Street, W.C.*1.—Res. med. asst. and clin. pathologist, £125.
*Infants Hosp., Vincent Square, Westminster, S.W.*1.—Hon. clin. assts. Also H.P., at rate of £100.
Kingston-on-Thames.—M.O. for Bentalls Ltd., £600.
Leamington Spa, Warneford General Hosp.—Sen. res. surg. O., £200.
Leeds, Menston Mental Hosp.—Sen. M.O., £650.
Liverpool University and Maternity Hosp.—Res. obstet. asst. and tutor, £250.
*London Chest Hosp., Victoria Park, E.*2.—H.P. and H.S., at rate of £160 and £100 respectively.
London County Council.—Asst. M.O. (class I), £350. Also asst. M.O.'s (class II), each £250.
*London Hosp., E.*1.—Clin. asst. in X-ray dept., £100. Also anæsthetist to dental dept., £25.
*London Jewish Hosp., Stepney Green, E.*1.—Res. M.O. and H.P., at rate of £150. Also H.S. and cas. O., each at rate of £100.
Manchester, Christie Hosp. and Holt Radium Institute, Withington.—Visiting anæsthetist.
Manchester, County Mental Hosp., Prestwich.—Locum tenens M.O., 7 guineas per week.
Manchester, Saint Mary's Hosps.—Res. anæsthetist, £100.
Manchester City.—Two res. asst. M.O.'s for Booth Hall Hosp. and res. asst. M.O. for Withington Hosp., each at rate of £200.
Manchester Royal Infirmary.—Jun. asst. M.O. for Barnes Convalescent Home, at rate of £150. Also hon. asst. radiologist.
Manchester University.—Pilkington fellowship in cancer research £300.
*Metropolitan Hosp., Kingsland Road, E.*8.—Cas. O. and res. anæsthetist, £100.
Middlesex County Council.—Various appointments, £1000 per annum to 3 guineas per session.
Milford, Surrey County Sanatorium.—Jun. asst. res. M.O., at rate of £250.
*Miller General Hosp., Greenwich Road, S.E.*10.—Two cas. O.'s, each at rate of £150. Also H.P. and H.S., each at rate of £100.
Newton-le-Willows and Golborne Urban Districts.—M.O., £800.
Nottingham, Children's Hosp.—Res. H.S., at rate of £150.
Nottingham General Hosp.—Res. cas. O., at rate of £150.
Oxford, Warneford Hosp. for Mental Disorders.—Locum tenens, 7 guineas per week.
Port Elizabeth, South Africa, Provincial Hosp.—Jun. radiographer, £145.
Preston and County of Lancaster Royal Infirmary.—Cas. H.S., at rate of £150.
Reading, Battle Hosp.—Res. asst. M.O., £300.
Rochester, St. Bartholomew's Hosp.—H.S. and H.P., each at rate of £150.
*Royal Cancer Hosp., Fulham Road, S.W.*3.—Surg. reg., £150. Also H.S., at rate of £100.
*Royal London Ophthalmic Hosp., City Road, E.C.*1.—Pathologist and curator, £650. Also asst. surgeon.
Royal Naval Medical Service.—M.O.'s.
*Royal Northern Hosp., Holloway, N.*7.—H.S., at rate of £70. Also consulting physicist.
Ryde, Royal Isle of Wight County Hosp.—H.P., £130.
Southampton, Royal South Hants and Southampton Hosp.—H.P., at rate of £150.
Southend-on-Sea General Hosp.—H.P., H.S., and cas. O., each at rate of £100.
Stepney Metropolitan Borough.—Tuberculosis officer and asst. M.O.H., £750.
Stoke-on-Trent City Education Committee.—Asst. school M.O., £500.
Sutton, Sutton and Cheam Hosp.—Jun. res. M.O., at rate of £100.
Truro, Royal Cornwall Infirmary.—Jun. H.S., £120.
Twickenham Borough.—Deputy M.O.H., £750.
Walsall General Hosp.—H.S., at rate of £150.
Warrington County Borough.—Asst. M.O., £500.
West Ham County Borough.—Med. supt. for South Ockendon Colony, £900.
West Hartlepool, Cameron Hosp.—H.S., £150.
West Sussex County Council.—Res. med. supt. and asst. county M.O.H., £700.
Wolverhampton Royal Hosp.—H.S. for fracture and orthopædic dept., at rate of £100.
*Woolwich and District War Memorial Hosp., Shooters Hill, S.E.*18.—Surg. reg., £100.

The Chief Inspector of Factories announces vacancies for Examining Factory Surgeons at Stratford-on-Avon (Warwick) and Montrose (Angus).

Westminster Hospital, Broad Sanctuary, S.W.1.—In the advertisement which appeared in THE LANCET of April 22 and 29 inviting applications for the post of Part-time Chief Assistant and Registrar to the Radiological Department (Diagnostic) and Full-time Chief Assistant and Registrar to the Electrical and Irradiation Unit, the closing date for applications, through a printer's error, was shown as Saturday, May 27. This should have read Saturday, May 6, and all applications should be received by this date.

COMPULSORY MILITARY TRAINING

UNDER the Military Training Bill, which on Monday was ordered to be printed, male British subjects between 20 and 21, with certain exceptions, are to apply for registration and thereafter are liable to be called up for training within twelve months. Men ordinarily resident in the dominions or colonies, members of the regular forces and those who were before April 27, 1939, members of the reserve and auxiliary forces are exempt. Anticipation or postponement of liability to be called up may be permitted if the Minister of Labour or a committee appointed by him to investigate cases of "hardship" sees good cause. A conscientious objector may apply for provisional registration in a special register and will have to make an application to a local exemption tribunal stating whether he objects (*a*) to being registered in the milithry training register, (*b*) to undergoing military training, or (*c*) to performing combatant duties. This local tribunal may confirm the registration as final or as conditional on the applicant performing work designated as of national importance; or it may direct that he shall be entered in the military training register as liable to be employed only in non-combatant duties, or without qualification. The Minister may appeal from this decision to a central tribunal but the applicant may appeal only if leave is granted or if the local decision is not unanimous. After registration a man liable to be called up will be required to attend a medical board appointed by the Minister, who will pay such remuneration and allowances to members of this board and to consultant examiners as he may, with the approval of the Treasury, determine. Persons undergoing examination will be paid travelling and other allowances, including compensation for loss of remunerative time. Provision is made for compelling employers to reinstate employees, on termination of their training period, unless they are able to prove that it is not practicable. Education authorities and governing bodies of universities and schools are required to furnish information about present or former male students. During the initial period of six months' military training—to be followed by three and a half years in the militia or auxiliary forces—the man will be clothed, fed, and accommodated from military sources. His pay and conditions of service during the period of service have yet to be decided. Special allowances will be paid in case of need to wives and dependants.

THE MINISTER OF HEALTH AND SOCIAL SERVICES.—At a luncheon of the Industrial Welfare Society on Friday the Minister of Health said that the provisional maternal mortality figures for 1938 showed a further reduction from 3·13 per 1000 births in 1937 to 2·97 in 1938. This was the lowest figure ever recorded in this country. During the period 1927–37 the infant mortality-rate had fallen from 79 to 56, and the tuberculosis death-rate from 79 to 56. The toll of sickness upon industry remained, however, very great. The gross total expenditure on benefits under National Health Insurance amounted in 1937 to £28,000,000. Industry, said Mr. Elliot, had its own part to play in dealing with this problem, and he was glad to know that many firms had appointed doctors, nurses and other trained experts to watch over the health of their staffs. He regarded this preventive work as of the greatest value. He knew that enlightened employers were keen to keep abreast of every development in the scientific and medical field, and he called their attention to the problem of fractures, which had been the subject of an inquiry by an interdepartmental committee whose report was shortly expected. Encouraging progress had already been made in the provision of up-to-date facilities for the treatment and aftercare of fracture cases, and he hoped that with the coöperation of all concerned more might yet be done.

INFECTIOUS DISEASE

IN ENGLAND AND WALES DURING THE WEEK ENDED APRIL 22, 1939

Notifications.—The following cases of infectious disease were notified during the week: Smallpox, 0; scarlet fever, 1467; diphtheria, 825; enteric fever, 16 (25 "expected"); pneumonia (primary or influenzal), 1270; puerperal pyrexia, 203; cerebrospinal fever, 51; acute poliomyelitis, 8; encephalitis lethargica, 5; dysentery, 21; ophthalmia neonatorum, 133. No case of cholera, plague, or typhus fever was notified during the week.

The number of cases in the Infectious Hospitals of the London County Council on April 28 was 3143, which included: Scarlet fever, 656; diphtheria, 615 (carriers, 26); measles, 7; whooping-cough, 1029; puerperal fever, 16 mothers (plus 10 babies); encephalitis lethargica, 303; poliomyelitis, 3. At St. Margaret's Hospital there were 22 babies (plus 12 mothers) with ophthalmia neonatorum.

Deaths.—In 126 great towns, including London, there was no death from smallpox or from enteric fever, 5 (0) from measles, 3 (0) from scarlet fever, 20 (5) from whooping-cough, 18 (1) from diphtheria, 33 (9) from diarrhœa and enteritis under two years, and 91 (9) from influenza. The figures in parentheses are those for London itself.

Birmingham had 10 deaths attributed to influenza, Swansea 7, Walsall 4, Luton 3, no other great town more than 2. Fatal cases of diphtheria were scattered over 13 great towns Birmingham reporting 4, Blackpool and Manchester each 2.

The number of stillbirths notified during the week was 250 (corresponding to a rate of 34 per 1000 total births), including 36 in London.

Births, Marriages and Deaths

BIRTHS

CARGILL.—On April 18, at Halifax, the wife of Dr. David Cargill—a son.

CLARKE.—On April 25, at Rangoon, Burma, the wife of Captain Oswald Weir Clarke, R.A.M.C.—a son.

GEIDT.—On April 25, the wife of Dr. David W. Geidt, of Exmouth—a son.

HAMILTON.—At 39, Palmerston Place, Edinburgh, on April 28, to Margaret (née Provan), wife of A. J. C. Hamilton, F.R.C.S., Inverness—a son.

VAIZEY.—On April 26, at Welbeck Street, W.1, the wife of Dr. J. Michael Vaizey—a daughter.

WALTON.—On May 1, at Norwich, the wife of Captain H. C. M. Walton, R.A.M.C.—a son.

WHITE.—On April 18, at St. Mary's Hospital, W.2, the wife of Mr. J. A. White, F.R.C.S.—a son.

DEATHS

BOLAM.—On April 28, at Newcastle-on-Tyne, Sir Robert Alfred Bolam, M.D. Durh., F.R.C.P., aged 67.

CORNER.—On April 23, Frank Corner, M.R.C.S., L.R.C.P., J.P., aged 77 years, of 29, Blanfield Road, W.9, and the Royal Societies' Club, London.

DAVIES.—On May 1, at Wrexham and East Denbighshire War Memorial Hospital, John Edward Henry Davies, D.S.O., M.R.C.S., lieut.-colonel R.A.M.C.

EDWARDS.—On April 26, at Milford-on-Sea, Hants, Charles Reginald Edwards, M.R.C.S., late of Jamaica, aged 79.

ORR EWING.—On April 26, at Cairo, Geoffrey Orr Ewing, M.B. Melb.

PENNY.—On April 30, at Uckfield, Sussex, Edmund John Penny, M.D. Brux., M.R.C.S., L.S.A., late of Wolverton, Bucks, aged 77.

RUSHWORTH.—On May 2, at Horsham, Frank Rushworth, M.D. Lond., aged 81.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

". . . Censorship is very tempting, but I am against it. It makes unreliable papers. It makes discredited papers. It makes dull papers . . . . I would rather have the criticism of a free press than the adulation of a kept press. If I were a dictator the press flatterers would drive me mad."—Sir SAMUEL HOARE, speaking to the Newspaper Society, May 2.

NOTES, COMMENTS, AND ABSTRACTS

THE PROTEINS OF THE CANCER CELL

IN their paper on the chemistry of tumours, which we review in a leading article this week, Kögl and Erxleben[1] begin by discussing the process of malignant degeneration, pointing out that so many causes have been suggested—including growth stimulants, carcinogenic hydrocarbons and viruses—that it is widely doubted whether a common cause of cancer is to be found. They themselves think that cancer is essentially an abnormality of growth, and that its origin is to be sought in the cell itself. The difference between organised and disorganised growth cannot, they hold, be ascribed to changes in the nutritional circulation in the cell; it lies rather in the utilisation of such substances and is related to the protein make-up of the cells, though hitherto no significant differences between the proteins of normal and tumour cells have been reported.

Chemical investigation has shown that the biological activity of substances is fundamentally changed, not only by structural alterations in the molecules, but also by apparently trifling steric changes; for optical isomers may differ widely in their action. The naturally occurring amino-acids, although differing in the sign of their optical rotation, have almost all been found to be members of the same steric series—viz., the *l*-series. These have accordingly been designated the "natural" amino-acids. The only known exceptions are the *d* (+) proline from ergotinine and the *d* (−) glutamic acid in the specific immune capsular substance of the anthrax bacillus. Kögl and Erxleben therefore thought it possible that stereochemical changes may be concerned in malignant degeneration, and with this idea have investigated the amino-acids of tumour proteins. After isolation from tumour tissue by extraction and precipitation these were subjected to short acid hydrolysis and the resultant amino-acids were separated by the accepted methods. Precautions were taken against accidental racemisation of the amino-acids, and those amino-acids well known to undergo such changes (serine, proline, cystine and alanine) are excluded from the discussion. The amino-acids from normal calf lung gave the rotational values for the *l*-series that are to be found in the literature, but those derived from the Brown-Pearce rabbit tumour and from the Stamm-Ehrlich mouse adenocarcinoma showed about 4 per cent. of *d*-leucine and of *d*-lysine. The former tumour also contained 44·5 per cent. of *d*-glutamic acid, while a non-irradiated ovarian carcinoma from a human source contained 42·7 per cent. of *d*-glutamic acid. The glutamic acid of the tumours is thus seen to be chiefly in the racemic form (89 per cent., or 44·5 per cent. *d*-form), and the investigators estimate that at least a tenth of the whole tumour protein is racemised. Although little is known about the racemisation of glutamic acid in acid solution, a similar analysis of normal ovarian tissue showed the presence of the normal *l*-acid exclusively. Human ovarian tumour and mammary carcinoma, on the other hand, contained large amounts of the *d*-glutamic acid (15·6, 31·7, and 24·6 per cent. respectively). The lower values in the material from human sources may be ascribed to contamination with non-tumour material and it is suggested that the degree of racemisation may possibly serve as an indication of the purity—or even of the degree of malignancy—of a tumour. Tissue from rabbit tumours and from normal organs of tumour-bearing or of normal rabbits gave confirmatory results. The glutamic acid in the tumour tissue contained 42·6 per cent. of the *d*-form, but that in the normal organs was entirely in the *l*-form.

The distribution of the racemised proteins in the tissue is discussed as regards the arrangement of the abnormal amino-acids in the protein molecules, and Kögl and Erxleben argue that variations in the tissue proteins would be associated with changes in the proteolytic enzymes of the cells. This view is supported by the known resistance of peptides containing *d*-amino acids to the attack of the usual peptide-splitting enzymes. It is recognised that in the body the amino-acids can undergo an oxidative de-amination, and it has been found that kidney and liver slices can de-aminate amino-acids of the *d*-series in addition to those of the *l*-series.[2] Furthermore, the *d*-enzyme is more resistant than the *l*-enzyme to mechanical or chemical attack. The presence of enzyme systems capable of dealing with the *d*-series of amino-acids is linked up with the observation that members of the *d*-series can be converted in the body into those of the *l*-series.[3] Glutamic acid has long been known to be especially reactive, and the oxidative de-aminating systems of the *l*-glutamic acid have similarly been found to be less active than those of the *d*-compound.[4] In contrast, the *apo*-dehydrase system present in liver interacts only with glutamic acid of the *l*-series.[5]

The special function of glutamic acid is also exemplified by the part which it plays in the trans-amination discovered by Braunstein and Kritzmann in 1937 and recently discussed by them again.[6 7] The responsible aminopherase systems reversibly transfer the amino-nitrogen of dicarboxylic acids to keto-acids; thus glutamic aminopherase can transfer an amino group from glutamic acid or to ketoglutaric acid. It is of especial interest that the enzyme system is optically selective, "only the natural *l*-forms of the amino acids act as NH_2-donators with aminopherase solutions."[6] Furthermore, the amino-acids formed also belong to the *l*-series: the evidence for a slight transformation of the *d*-amino acids is inconclusive. Although the occurrence of trans-aminating systems in tumour tissue is still a matter of controversy, they appear, at any rate, to be less active than in muscle.[5] It is therefore highly suggestive that tumour tissue is comparatively deficient in an enzyme system which is specific for the transformation of *l*-amino acids.

In considering the result of carcinogenic stimuli, Kögl and Erxleben conclude that the essential change in the cell is to be sought in the enzymatic protein synthesis and they put forward the hypothesis that the cancer cell has lost the capability possessed by the normal cell of utilising only the normal *l*-amino acids in building up its structure. Although it is not known which ferment system is primarily concerned, it seems significant that in the amino-acid oxydase system it is the *l*-system which is most easily destroyed, while the capacity for using the *d*-series of acids

1. Kögl, F., and Erxleben, H., *Hoppe-Seyl. Z.* 1939, **258**, 57.
2. Krebs, H. A., *Ibid.* 1933, **217**, 191, and **218**, 157; *Biochem. J.* 1935, **29**, 1620, 1951.
3. du Vigneaud, V., and Irish, O. J., *J. biol. Chem.* 1935, **109**, p. xciv: 1938, **122**, 349.
4. Weil-Malherbe, H., *Biochem. J.* 1936, **30**, 665.
5. von Euler, H., Adler, E., Günther, G., and Das, N. B., *Hoppe-Seyl. Z.* 1938, **254**, 61.
6. Braunstein A. E., *Nature, Lond.* April 8, 1939, p. 609.
7. Kritzmann M. G., *Ibid*, p. 603.

remains. The latent period elapsing between the application of a carcinogenic stimulus and the inception of malignancy is uncertain; but the time taken by methyl cholanthrene, for example, to produce a tumour in the mouse is of the same order as that required for renewal of the tissue proteins, as estimated by nutrition experiments in feeding amino-acids containing deuterium.[8] In normal growth, it is assumed, the optical purity of the tissue proteins is maintained by a ferment system converting any acids of the "abnormal" *d*-series into the corresponding *l*-compounds. When this regulating mechanism is upset, there may be a latent period before the abnormal constituents reach a critical concentration. In the opinion of Kögl and Erxleben the great variation in the resistance of the organism to carcinogenic stimuli may well be referred to the great capacity for variation in the protein make-up of the tissues. The wide variation possible in the proteins also allows for differences in the resultant malignant manifestation, and tumours may be regarded as inferior imitations of normal patterns, further shown by the variation between the tumour cells themselves. In autonomous growth, infiltration of the surrounding tissues takes place, since the normal cells do not possess the enzymes required to check the invasion of the tumour cells. The varying degree of invasion that is found may be related to the wide limits between which the steric changes (racemisation) can occur. As an example, the amino-acids of a benign uterine myoma were found to be racemised, if at all, to a very much smaller degree than those derived from malignant growths. Even in malignant tumours the racemisation can be but partial; otherwise any parasitism would be impossible.

The Dutch investigators doubt whether the filtrable viruses are to be classed with the ferment systems responsible for the irregular protein production. They emphasise that the *d*-series of amino-acids and their derivatives may not necessarily be always pathological; they may in fact possess other functions, as in the possible formation of antibodies.[9] While admitting that the problem of malignant degeneration requires the consideration of many other factors, they claim that this in no way vitiates the significance of the present findings.

CHEMOTHERAPY IN EXPERIMENTAL TUBERCULOSIS

By giving comparatively enormous multiple doses of M. & B. 693 to guineapigs W. H. Feldman and H. C. Hinshaw (*Proc. Mayo Clin.* March 15, 1939, p. 174) have apparently been able to retard and modify the course of subsequently inoculated tuberculosis. Each of twenty guineapigs was given 250 mg. of 2-sulphanilyl aminopyridine (M. & B. 693) by mouth twice daily for three days and was then inoculated subcutaneously over the sternum with 0·0001 mg. of a strain of tubercle bacilli isolated three months earlier from a patient with pulmonary tuberculosis. Similar doses of M. & B. 693 were then given for a further ten days and then halved, administration of the drug being continued until the death of the animal or the end of the experiment eight weeks after the inoculation. A control group, comparable in age and size, was inoculated with the same strain of tubercle bacilli but received no drug. When a guineapig in one group died and showed macroscopic tuberculous lesions (microscopic lesions are disregarded in the report under consideration), an animal in the other group was killed and examined for the purpose of comparison. Such lesions were found in all the members of the control group, the spleen of each being strikingly tuberculous and the lungs of nearly all of those that came to necropsy five weeks or more after inoculation being slightly to moderately affected. The lesions in the 693-treated group 23–56 days after inoculation are summarised thus: definite lesions of liver, lungs, and spleen in 1 animal; pulmonary lesion with doubtful lesion in spleen in 4; doubtful lesion of spleen alone in 1; and no macroscopic lesion in liver, lungs, or spleen in 6. The experimenters suggest that, since M. & B. 693 is excreted very rapidly, the level of the drug in the blood was probably not maintained, and that smaller doses given every four hours might have been even more effective. They, however, realise that, although saturation of the tissues with M. & B. 693 before inoculation of tuberculosis appears to modify and retard its course, their results do not imply that the drug would be of any value in the treatment of tuberculosis.

8. Ussing, H. H., *Ibid*, 1938, **142**, 400.
9. Lettré, H., *Z. angew. Chem.* 1937, **50**, 581.

FEMININE PHYSIOLOGY IN THE FAR EAST

Comparative data about the human menstrual cycle are scarce, and it is interesting to have a report from P. Huard, A. Bigot, and Do-Xuan-Hop on their investigations in Indo-China (*Rev. méd. franc. extrême Orient*, 1938, **19**, 751). The work is based on inquiries made among Annamite or Eurasian girl students and hospital patients in Hanoi and among some 1200 girls and women living in the town and its suburbs. The authors were careful to limit their investigations to those whom they thought would give material for truly representative statistics.

The recognised criteria of puberty are inapplicable to the Annamite girls, for they develop pubic hair comparatively late in life, if at all, and in the country districts they still wear the traditional garment restricting the breasts. They usually experience their first period during the hottest months of the year, and the date is earlier among girls living in the towns. There is some evidence, too, of a relation between the social class—i.e., the degree of luxury enjoyed—and the onset of menstruation. Thus the age of the first menstruation is most frequently 13 years 6 months for Annamites of "bourgeois" class and 16 years 3 months for peasant women. The average age for these two Annamite groups was 14 years 10 months, while among the half-caste girls it was 13 years 3 months. These figures the authors compare with those for other types as follows:—

TYPE	FIRST MENSTRUATION
Annamites	14 years 10 months
Eskimos	15 ,,
Japanese	14 ,, 7 ,,
Koreans	15 ,,
Chinese	14 ,, 5 ,,

The comparison gives no support to the popular idea that puberty is early in warm countries, for there is no great difference in the time of onset among mongol types living under vastly different climatic conditions.

Reviewing the observations of other workers, Huard and his collaborators refer to C. A. Mills's belief that in the United States the menarche becomes earlier in every generation, and his suggestion that it is gradually approaching that of the tribal Indians who have been acclimatised for several centuries. L. Bolk, they say, reports a similar progressive advance in Holland and attributes it to the increased tempo of life. It seems to be clear, too, that puberty comes later under conditions of malnutrition and poor hygiene and earlier in towns than in the country, or when the girl is cut off from modern life.

In Annamites the interval from one period to the next was found to be 28–30 days in 60 per cent. of cases; but it seems that normal menstruation, although periodic, is hardly ever absolutely regular. In 84 per cent. of cases investigated it lasted for three, four, or five days, but some women had "normal"

periods lasting six, seven, or eight days. Of 717 women questioned 31 had no periods, and of these 16 had nevertheless borne several children; this seems to happen quite often with the women of Annam. The menopause usually comes on between 43 and 50.

The usual age of first marriage is a little over eighteen years, and it seems that, as in China, modern education and customs in Indo-China have delayed the traditional marriage age by about two years. The mean age for the first pregnancy is 20 years 9 months—i.e., after less than two years of married life. There are 2 living children per family, the stated pregnancies amounting to 3·9 per woman (3·66 births and 0·24 abortions). The sex ratio of infants born is about 118 males to every 100 females. Infant mortality is high and nearly half the children die during their first fifteen years.

Huard and his co-workers conclude their report with an account of the traditional ceremonies and popular beliefs related to the menstrual period in Indo-China. Its advent is apparently unimportant in the life of an Annamite girl, but many superstitions have arisen from the belief that a menstruating woman is impure. In Cambodia and certain other districts elaborate public rites are associated with the appearance of the menstrual function.

PECTIN IN DIARRHŒA

IN the Ingleby lectures concluded in our present issue Dr. Smellie speaks pessimistically of the apple diet, saying that he has never seen even temporary improvement from its use in infantile diarrhœa. Meanwhile the remedy seems to find fresh converts on the Continent, and the alleged usefulness of apple pulp is now attributed by P. Corsonello not to the cellulose or tannic acid it contains but rather to the pectin, which he says acts by absorption of water, toxins, and bacteria, either in alkaline or in acid fæces (*Minerva med., Roma*, 1938, **29**, 590). Pectin, a methyl ester of pectic acid, was discovered in 1825 by Braconnot and for many years has been produced commercially, mainly from the white of the rinds of citrus fruits and from the pomace produced in the manufacture of cider and perry. It was thought for a long time that pectin, used for making a stiff gel in jams, could act only in an acid medium, and great trouble was taken by the manufacturers to obtain the correct degree of acidity; but G. Spencer in 1929 reported that gels could be equally well formed in an alkaline medium. Besides confirming Spencer's observation, Corsonello publishes ten cases of apparent cure with pectin in either putrefactive or infective diarrhœa.

OPIUM IN MANCHURIA

IN his account of opium administration in Manchukuo in *Contemporary Manchuria* (January, 1939, p. 18), T. Nagashuna frankly admits that the opium policy which Manchukuo has adopted under Japanese supervision "is not altogether free from conflicting opinions when viewed from an impartial and fair standpoint." It appears that opium addicts abound throughout the country, the estimated number of smokers amounting to 900,000. A ten-year scheme of reform has been promulgated comprising the registration of addicts, prohibition to minors, and the setting up of a state monopoly for opium to control cultivation, sale, and importation of the drug. There are government infirmaries for the relief and cure of addicts but these seem to be merely accommodating quarters for smokers, and the number of "cured" addicts that have needed readmission is said to have increased by 70 per cent. A total of 200 infirmaries are to be built or enlarged within the next three years with a view to curing all of the existing 900,000 addicts within ten years. The average time required to cure an addict is said to be 50 days, but it is assumed that 50,000 will either rid themselves of their habit or die before the ten years is up. Contrary to the view officially maintained in India it is asserted that, providing that good-grade opium is used, there is little harm in smoking compared with eating opium.

Allusion is made to the importation into China of Bengal opium, which in 1830 had reached such an excess as to lead to the burning of 20,000 boxes of the drug by the Chinese, and the famous yet infamous opium war. The efforts of the Shanghai commission of 1909 are regarded as nugatory and little or no significance is attached to the international opium conventions of 1912, 1925, and 1931. The article sets out the elaborate provisions of the new law of 1933, and gives details of the profits derived from the state monopoly of opium and the purposes to which they are to be applied.

This rather roseate review hardly harmonises with the reports made to the League of Nations. Last year the assembly was informed that the areas of China under Japanese control so far from showing any improvement had become worse. Allusion was made to some 3840 licensed opium saloons in 181 cities in Manchuria and Jehol, and it was affirmed that the Japanese had taken advantage of their incursion into Chinese territory to spread drug addiction among the Chinese population. Increased imports by Manchuria of Iranian opium were reported, as well as the manufacture there of narcotic drugs for illicit purposes.

DERMATOLOGY AND FOLK-LORE

ADDRESSING the St. John's Hospital Dermatological Society on April 26, with Dr. R. T. Brain, the president, in the chair, Dr. J. D. Rolleston said that no skin disease, nor indeed disease of any kind, had received so much attention in folk medicine as warts, the literature on the subject even exceeding that on whooping-cough or "ague." Next in importance in popular estimation came herpes zoster and then alopecia, boils, burns, cosmetic defects, congenital abnormalities, ringworm, urticaria, cancer of the skin and chilblains in the order named. As in his previous paper on "Folk-Lore and Medicine" (see *Lancet*, Jan. 21, 1939, p. 160) Dr. Rolleston discussed the various preventive and therapeutic measures used in folk-lore under the following headings: (1) transfer of the disease to other persons, animals or inanimate objects; (2) animal and plant remedies; (3) religious influences, including invocations to patron saints; (4) the healing power of water in the form of wells, springs, fountains and streams; (5) the mystical power of odd numbers; (6) repellent and disgusting remedies for the object of driving out the evil spirit supposed to be the cause of the disease; and (7) miscellaneous cures, such as the doctrine of signatures, the influence of the moon and fasting saliva.

IMPRISONMENT FOR SEX OFFENCES

Mr. Pollens describes American experience and takes the view that for the dangerous sex criminal imprisonment is not a cure.[1] The offender, even if incurable, can be permanently secluded only if he is insane, though a term of imprisonment is no safeguard against further offences. The situation is the same here and parallel case-histories are to be found in this country. The author hopes for reform by improvement of emotional education and encouragement of normal sex development, placing the blame for many sex perversions upon ignorance and taboo—a view for which there is much to be said, although more deep-seated influences are probably at work. The book is written in everyday language and, whilst it adds little to expert knowledge of the subject, it may be recommended to anyone who feels the need for information about a type of disorder which is more easily condemned than understood.

1. The Sex Criminal. By Bertram Pollens. London: Putnam. 1939. Pp. 211. 7s. 6d.